THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., NOVEMBER 29, 1888. NUMBER 49.

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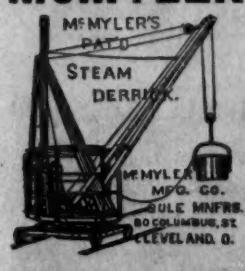

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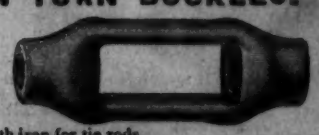

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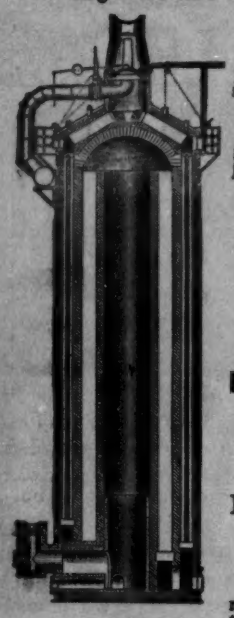

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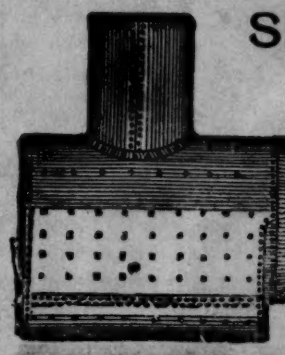

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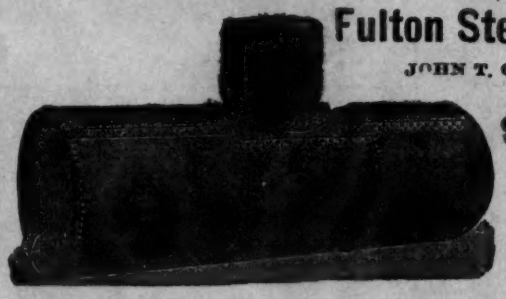

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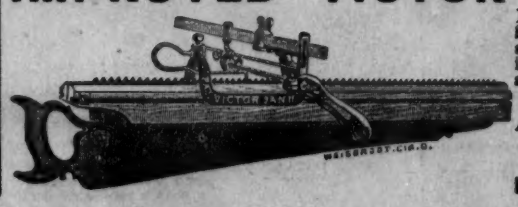

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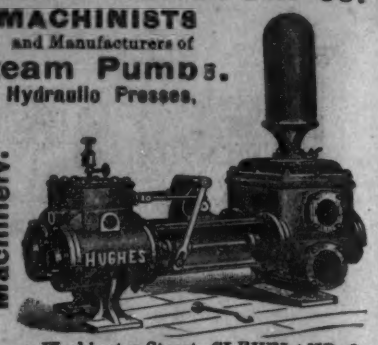

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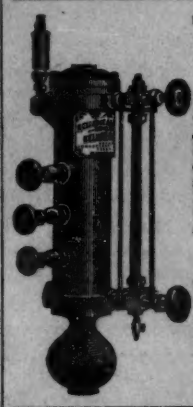

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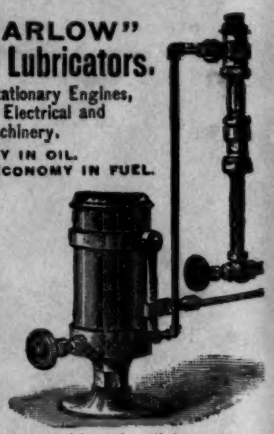

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THE
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VOLUME XXI. CLEVELAND, O., NOVEMBER 29, 1888. NUMBER 49.

IMPROVED CABLE MACHINERY.

On this page and a succeeding one are illustrated recent improvements in cable machinery, turned out by the Walker Manufacturing Co., Cleveland, O. We describe the cuts in the order in which they appear:

500 H. P. FRICTION CLUTCH COUPLING.

The outer member of this coupling (Fig. 1) is a plain, ordinary casting with eight arms, and a hub on outside secured to shaft; the inner member has a boss or center with four bored arms into which are fitted segments, with corresponding arms to fit into same.

The arm part of the segments is hollow, and has an inner flange on which rests a spring through which a bolt passes, and tensions the segments towards the center of the shaft; this spring can be adjusted so as to make the segment clear the outer member any desired amount when the coupling is not engaged. There are four wedges at the ends of segments, which are forced into position by adjusting screws and toggle lever, attached to sliding sleeve as shown; when these four wedges are forced out, the result is to lift each of the four segments in a direct line with the bore of the four arms and directly in opposition to the spring inside of segment arm; of course this spring is only adjusted sufficiently to keep the segments away from the outer member, as any undue pressure of the spring to force segments towards center of shaft would have to be overcome by the wedges. This coupling is very effective, and is doing good service at the 18th Street Power House in Kansas City, Mo. The sleeve is operated by a yoke and lever, with worm and wheel and hand wheel.

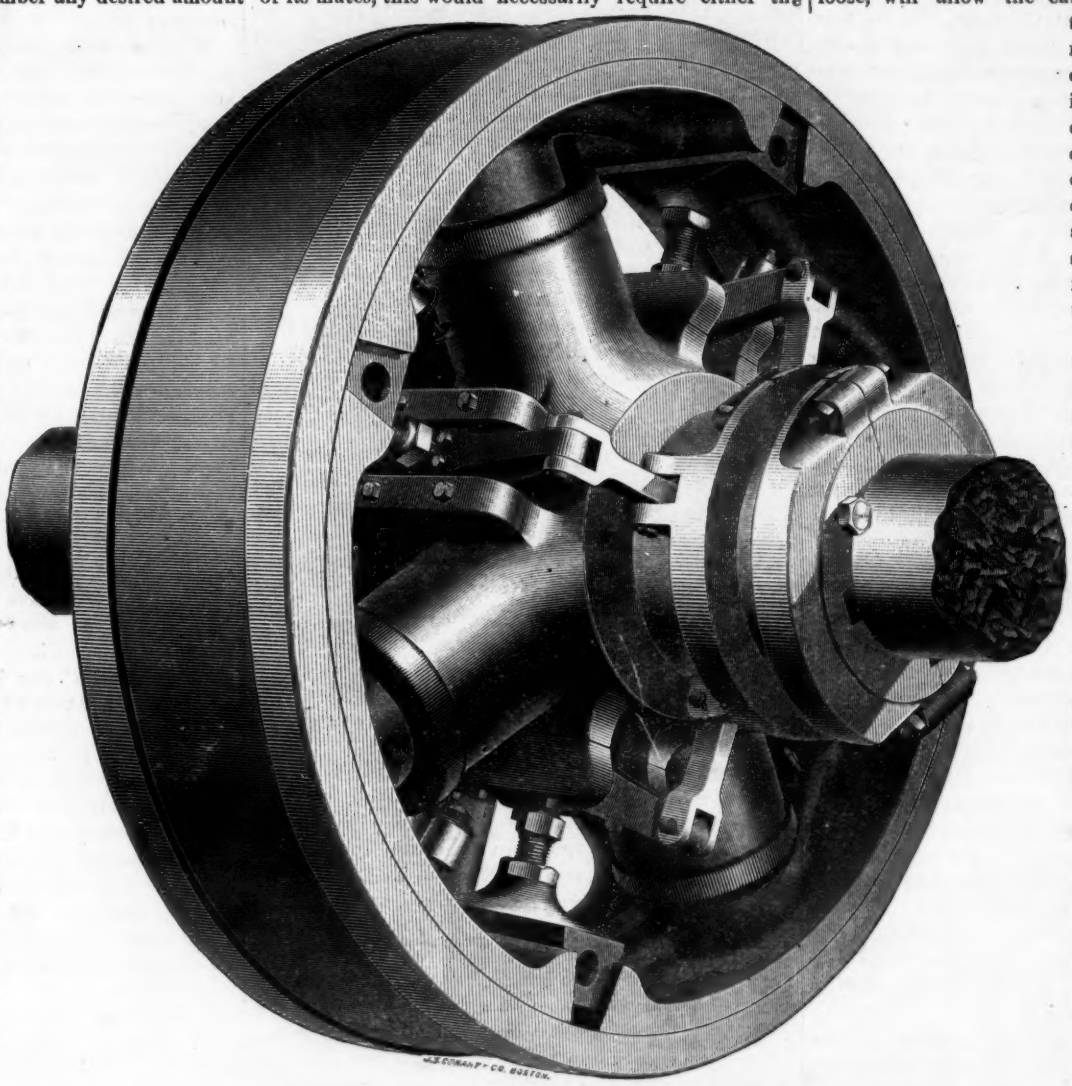

FIG. 1.—500 H. P. FRICTION CLUICH COUPLING.

"U" FRAME AND STAGGERED ARM SHEAVE.

This "U" frame (Fig. 2, page 813) is cast in two pieces so as to mold easily; it is hollow, with flanges in the center to bolt each half together, and also has ribs inside. The flanges form a backbone to the frame when bolted together. The sides are not pierced with holes as is common in such castings to get core out, when cast in one piece; these holes make such castings quite weak, especially so as the metal forming the plate or outside of the casting forms the greatest strength. The castings are securely bolted together and dowell-pinned before they are bored and fitted for the boxes.

The sheave has staggered arms, which makes a very rigid sheave for either horizontal or vertical motion. The principal advantage of the staggered arm sheave is a uniform casting; the arms not coming opposite each other dispenses with all undue strains, such as occur in straight arm castings.

This company has made a great many of these sheaves already of 8 ft., 10 ft., and 12 ft., diameter, with the same general success. As the sheave appears from an ordinary standpoint of molding, it would be very difficult, indeed, to mold; but they have a system of molding them which is very simple.

WALKER'S PATENT DIFFERENTIAL CABLE DRUMS.

These drums, (Fig. 3, page 813) are shown in section in cuts, so as to illustrate the loose differential rings on which the cable rests while in operation. It has long been known that the destruction to cables has been largely due to the grooves wearing irregular in the solid drums. Due to the severe strains which the first groove on the receiving drum is subjected to as a result of the varying loads, the wear is very excessive on the first groove in comparison with its mates in the old style drum wherein the grooves would be turned right into the solid face of the drum. It is quite evident that after the wear progressed to such an extent as to make a very great difference in the circumference of this first groove and that of its mates, this would necessarily require either the cable to stretch a given amount in each revolution of the drum, equal to the difference in circumference of the smaller and larger grooves, or that slippage take place in the groove, either of which would be very detrimental both to the drum and to the cable.

The differential drum dispenses entirely with any wear of the grooves, or any wear of the cable while on the grooves. The cable enters on the fixed ring, shown in section on the left hand side, and is wound onto left hand ring on end drum, and then back to second ring on leading drum; and so forth, putting as many wraps on as may be deemed necessary, according to the length of the cable. It will be seen that all the rings in the drums are loose excepting the ring on which the cable is hauled in from the street. Now should there be any inequality in diameter of the rings, whether in first construction or by subsequent wear in use, the rings will adjust themselves while drum is in motion, so that there can be no undue strain on any of the wraps on the drum. The rings on which the cable rests move slightly back or forth to suit the irregularities spoken of.

A cable is hauled on to drum under varying loads, according to the resistance or number of cars and amount of traffic on the road; from this it will be understood that the cable is wound on the drums tight or slack, according the variation of load. While the cable is passing around the drums, the tendency is for same to adjust itself or equalize the strains, which cannot be done on a solid grooved drum without cable slipping in the grooves; such slipping will wear the grooves and the cable also; but in the differential drums, the rings being loose, will allow the cable to become compensated through the movement of the rings, dispensing with all undue strains. When the cable is at work on these differential drums, each wrap between the drums appears like a solid bar of iron; and the impression of the cable is left in the tar at the bottom of ring, which shows conclusively that there is no slipping of the cable in the rings.

These rings have a diametrical friction due to the pressure of the cable in the grooves transferred to the flat surface of the drum or the underside of the rings. The combined diametrical friction of the various loose rings is sufficient, with the leading ring which is secured, to drive the cable; however loose, side flanges are provided, with side studs and self-registering wrench in order to produce a side friction when necessary. The self-registering wrench will so adjust the studs as to produce an equal amount of friction around the entire circumference of the rings. Each individual wrap will move an individual ring with about one-fortieth (1-40) of the strength of the cable, thus the compensation is Walker's patent differential drums thoroughly accomplished without any undue strain on the cable while passing over the drums. The bottom and sides of the rings are thoroughly lubricated by automatic grease cups inserted in the rim of the drums. These differential drums have been thoroughly tested at the 12th and 18th Street Cable Railways, of Kansas City, Mo., and the St. Louis Cable & Western Railway Co., of St. Louis, Mo., where they have been giving entire satisfaction. Other plants are being built on which these differential drums will be used.

THE Chickasaw coal mine, eleven miles north of Trinidad, on the Denver & Rio Grande R. R., in Texas, is opened up and five carloads of coal were taken out and sent to Denver to be tested. The vein is seven feet through and most extensive. The Beohora mines, six miles Southwest of Beohora Station, on the Denver, Texas & Fort Worth Road, are also open.

PETROLEUM FUEL.*

S. S. LEONARD.

The use of petroleum is by no means of recent date; it was known to the ancient Greeks and Romans, being used by them for illuminating purposes, as they had no electric lights in that day. In fact, the word "petroleum" is of Latin derivation, meaning "rock oil." It has been, and is being used for various purposes, from the sure cure of numerous diseases to the generating of steam for electric light stations. It is found in many parts of the globe, although there are but few localities that are especially noted for its production. In our own country, New York, Pennsylvania, Ohio and West Virginia produce the greater part of the supply. Although it was known to the early settlers of these States, very little importance was attached to its value. I presume that there are none so young here but who will remember the oil craze, and the saying which was heard almost daily of "So and So" has struck "ile." Perhaps some of the members of this convention were fortunate enough to strike "ile" and possibly some were unfortunate enough to have been struck by "ile."

But to return to our subject, petroleum fuel. To say that it is a new fuel would hardly be correct, for petroleum has been used as a fuel for a number of years. Experiments to determine its practicability as a fuel have been creating a good deal of attention from those interested in the matter for the last 20 years, and it is now occupying the minds of some of our ablest engineers and inventors. Quoting from a very able paper on this subject by Charles E. Ashcroft, which was published in the Boston *Journal of Commerce*, May 26, 1888. Mr. Ashcroft says that the calorific power of petroleum for the purpose of generating steam, and the evaporation of water, is several times greater than that of ordinary coal. The successful use of oil as a fuel has, however, been of a very recent date, yet so rapidly has it grown in favor that to-day it is regarded as a strong competitor of coal for steam generating purposes or where heat and fire are wanted. It was with a great many knowing winks and nods of the head from the engineers and firemen, who laughed at the idea of making steam by the use of oil, that the writer attempted the use of petroleum as a fuel. Of course, it would not work, and it did not work, why? Because those that were using it did not want it to, as they were afraid some one would lose his job. We had seen enough of its workings to satisfy ontselves that it could be made a success, and the result is that to-day we are saving from 20 to 25 per cent. on the cost of the fuel, and 50 per cent. in labor, and those same men who laughed so hard on the start of our attempt to use oil would feel that this world was a poor place to live in were we to return to the use of coal, for not only their hearts but their backs would certainly be broken.

Its advantages over other fuels are many. In the first place, it is much easier handled, a steadier fire is easily maintained under your boilers, consequently the steam is kept at a more even pressure, a very important thing in the running of electric lights; there is no opening of furnace doors, allowing cold air to come in contact with boilers, and there are no impurities in the oil such as abound in coal. When through with it, by a simple turn of the wrist your fire is put out, and your ash-pits are as clean as they were before the fire was started. In less time than it takes to tell it you can start the fire. It is only rivalled in handling by natural gas, and even then, unless we have all the modern appliances for the handling of this gas, it is far easier to manipulate.

Permit me to describe the arrangements for the handling and use of this oil put in under the supervision of the writer. The oil is received in tank cars holding from 90 to 150 barrels each (42 gallons to a barrel). From these cars it is drawn off through a valve in the bottom of the car to a storage tank or tanks, there being two of them, holding about 300 barrels each. These are placed under ground so that the oil runs from the car into them by gravity; care should be taken not to spill the oil or stir it up more than is necessary, as the odor from it is fully equal in strength to that of new mown hay, if not quite as agreeable. To prevent the stirring up of the oil, the supply pipes entering through the top of the tanks run nearly to the bottom, so that the tanks are practically filled from the bottom.

In the top of each tank is a man-hole and vent-pipe; this latter is extended above the tanks a short distance. These tanks, which are boiler-shaped, are placed end to end with a space of about eight feet between them. This gives room to get at the various pipe. They are joined together at the bottom by a pipe which also connects with the supply pipe running to the boiler room. Then in the bottom of each is a drain pipe which will admit of cleaning them out whenever necessary. There is also a gauge glass in the end of each, to show how much, if any, water is in them; there is also a gauge made by a copper float, which indicates the amount of oil in each tank. In cold weather a steam coil is inserted in the tank car around the mouth of the valve to heat the oil so that it will flow readily, for when the thermometer gets in the vicinity of thirty or forty below, the oil is apt to get a little thick. Care should be taken not to heat the oil too much, for when hot, it generates considerable gas, which is not only very odorous, but is really the cream of the fuel. I think it is an advantage to have the storage tanks underground, there being less danger from them in case of fire, and during the Winter the oil is less likely to chill. An open light should never be used near them, although the oil itself is really hard to ignite unless heated to a certain degree, still there is apt to be more or less gas around, which is quite explosive if brought in contact with fire. The supply pipes to the furnaces are provided with a valve where they enter each tank, also one in the fire-room. This pipe, a 2½-inch one, is enlarged to a 6-inch for about four feet, and in this 6 inch pipe a small steam pipe is inserted. With this, the oil is heated from 130 degrees to 140 degrees. This lightens it so that it burns more readily, or, I should say, is turned into gas.

We now come to the burners, which are also fed by gravity, as the storage tanks, although underground, are still higher than the furnaces. One might suppose that owing to the recent introduction of petroleum as a fuel, that some difficulty might be experienced in obtaining a burner, but their name is legion, and they are as numerous as electric light systems, and like them in another respect—each man's is the best. Our experience has been that the more simple the burner, the better the result. One that thoroughly vaporizes the oil before burning it is, we think, preferable to the one that burns the oil. In the former there can possibly be no waste. In furnaces where we have been using this kind of a burner, the bricks are as clean as they were the day they were put in. Steam and hot air are the other ingredients that are used in connections with the oil, and an abundant supply of the latter, we have found, adds very much to the efficiency of the fire.

Regarding the proper settings, circumstances will determine that to a certain extent. An excellent plan is given by the Standard Oil Company, in their pamphlet, "Oil as a Fuel." This we have adopted with a few modifications which we found necessary by experience. There is no doubt that a hotter fire can be obtained from oil than from coal or wood, and when the oil is properly used, the smoke nuisance is solved, which has been agitating the minds of the people of some of our large cities, for their is not a particle of smoke to be seen issuing from the stack, not even when everything is running full blast.

A word as to its danger: When properly put in and handled with ordinary care, or when good, common sense is used in the employment of this oil, I do not see why it should be any more apt to cause trouble than coal, although the insurance companies insist on higher rates when used. I think it more from ignorance of the subject than from there being any more danger. At the same time I am willing to admit that it could be put in and used in such a way as to greatly increase the danger of fire. So might your house be wired for electric lights, pipes for gas, or a kerosene lamp hung on your gasoline stove, filled in such a manner that the fire risk is much greater than with your neighbor who uses electric lights, gas, kerosene or gasoline the same as you do, but has his put in properly and handles it as it should be.

*Read by Mr. Allan V. Garratt, at the National Electric Light Convention, August 30, 1888.

A Very Convenient Word.

Speaking of writing letters, reminds us of one we saw a day or two ago, in which a new word was used—that is say, it will be new to many of you, though it has been employed in business correspondence for some time. A clause of the letter ran thus: "We hand you herewith pomo for $10, which please place to our credit, etc." Now, what is pomo? you ask. That is simply a very convenient contraction for "post office money order." It deserves to be formally adopted into the language, and no doubt it will be.—[Philadelphia Times.

THE only place in which amber is found in paying quantities is said to exist in the Baltic Sea.

THE COMMERCIAL VALUE OF ENGINE ECONOMY.

Evidences are multiplying that the steam users of this country have a steadily growing appreciation of the commercial value of economy in the steam plant. But little reflection is needed to convince any steam user that with the same efficiency in the boiler and furnace, any decrease in the amount of steam consumed by the engine will result in the same ratio of decrease in the amount of coal burned in the furnace. Therefore, so far as the engine is concerned, the proper basis for a comparison to determine the relative economy is the steam consumption. It is now the general practice among expert engineers to compute this consumption in pounds of dry steam per indicated horse-power per hour, and to determine the amount required by any engine by weighing the water fed to the boiler during the test and taking indicator cards at frequent and regular intervals. It has been frequently demonstrated that the indicator card, by itself, does not afford a reliable basis for determining the steam consumption, as it does not account for leakage or other losses directly owing to the construction of the engine. As an average, the indicator card does not account for more than 75 per cent. of the steam used, and the percentage varies from 80 per cent. down. When buying a steam engine under a guarantee, the purchaser should insist that the economy of the engine be measured by the steam consumption per indicated horse-power per hour, under a stated pressure, and that the amount be determined by a test under regular working conditions, the feed water being weighed to the boiler and not estimated from the indicator cards.

It is interesting to note the saving from using the more economical high duty engines. In general, it may be stated in regard to Corliss engines that the consumption will be as follows:

Non condensing	26	lbs. per I. H. P. per hour
Condensing	20	" " "
Compound condensing	16	" " "

This is on the basis of 80 pounds initial pressure. Until recently, the compound condensing Corliss engine was the highest type of an economical engine in this country. Within the past year, however, a quadruple expansion condensing Reynolds' Corliss engine has been built by the Reliance Works, of this city, and started in the cotton mill of the Warren Mfg Co., and although not running under the full load and steam pressure for which it was designed, has already demonstrated a marked improvement over compound condensing engines. The same firm is also building triple expansion condensing engines for use in flour mills, electric light stations and pumping stations, under guarantees lower than ever yet reached by compound engines. To be sure these engines cost more money, but the purchasers have satisfied themselves by careful figuring that the extra cost will bear a high rate of interest, due to the increased economy. One pound of water per I. H. P. per hour would not appear to be a large saving; but on a basis of eight pounds of water per pound of coal burned, and the engine running ten hours per day for 300 days, with coal at three dollars per ton, every pound of water per I. H. P. per hour saved by the engine will amount to 56 cents, or with a hundred horse-power engine, to 56 dollars, representing the interest on 800 dollars at seven per cent. If coal cost more than the price named, if the engine runs longer hours, as is the case in the great majority of steam mills, or if the boiler and furnace are less efficient, the saving will be more. It will thus be seen that even a slight saving will pay a commercially profitable rate of interest on a very considerable difference in cost. That mill owners appreciate this is proven by the largely increased number of inquiries for compound engines.—[Milling Engineer.

Boiler Explosions.

Explosions of steam boilers are not only due to mismanagement and general deterioration, but to unequal pressure, caused by faulty construction. The evil can only be overcome by frequent and thorough inspection, and this the insurance companies do for their patrons. In the way of indemnity, too, they not only make good the loss of the boiler, but also cover all damages to buildings and contents, and exempt the owner of the insured boiler from the payment of damages for lives lost by the explosion. These facts are not generally known, but the press is gradually proclaiming them, and the companies are flooding the land with pamphlets describing their work, and it will not be many years before boiler insurance will be as common and as much sought after as fire insurance.—[Investigator.

THE EXAMINATION OF CAST IRON.

TRANSLATED FROM "LE CHARBON."

The problem which consists in estimating the quality of cast iron is not of the same importance in all foundries. In many small foundries only one quality of iron has been required for years, and the proportions are sufficiently well known to make easy to dispense with the examination of the cast iron. It is not so, however, in large iron foundries, which use directly the products of the blast furnaces. This direct method was formerly the only one employed, and it is still adopted wherever the blast furnace is heated with charcoal. Small blast furnaces heated with charcoal are greatly affected in their working by accidental irregularities resulting from the mixture, the charging, the dampness of the materials which have been introduced, the temperature of the current air, etc., and the most experienced founder is not always sure of obtaining a casting of invariable quality. It follows that it is necessary to examine the cast iron, often several times a day, to see if it is suitable for the purpose for which it is intended.

The method is simple and pure. The quality is determined according to the agitation of the crude iron. This test is carried out every morning in the presence of the foreman. A mould is made with the hand in the sand of the hearth in front of the blast furnace, having the form of a cylindrical hole 20 centimetres in diameter and 7 or 8 centimetres deep. The iron is run from a casting ladle into this mould after the impurities have been removed from the surface of the bath. The color simply of the iron contained in the ladle enables them to estimate in a summary manner the quality of the iron cast. If the color is white and the surface of the metal is covered with a layer of gas burning with a colorless flame, the casting is considered to be satisfactory. If the metal presents a reddish appearance and gives place to the formation of crackling sparks, they are not very well satisfied with it. They then pour the metal into the sand mold and remove afresh the matter which covers the surface of the bath. Then the agitation of the iron commences. If the pig is rich in silicium and carbon, the iron being burnt, the surface of the bath is soon covered with a crust of oxidized formation, giving forth a pale light. This crust is broken from time to time by the rising of the metal below. Such an iron contains much graphite, and founders do not care a great deal for it. The kind of iron most suitable for being cast, even in small molds, and which does not give place to the formation of scum present, immediately after being poured out, a very great degree of mobility and of some duration. But when the agitation is very short, and if brownish spots form on the surface (which has been the subject of so much discussion in metallurgical literature) accompanied by sparks in large quantities, the metal is poor in silicon, is hard, easily becomes white, and is only suitable for large castings. The characteristic signs manifested by the agitation of the metal are nearly always the same in most foundries, but there are others which vary with the kind of blast furnace. In cupola furnaces when the recasting of raw iron used in commerce is carried on, the agitation of the metal is not of a nature such as to give sufficient indications of the quality of the raw iron, and on the value of the mixtures which have been introduced into the blast furnace. In such cases other methods of investigation have to be followed.

In certain large foundries, resisting tests are tried with the material worked. This method is much to be recommended. In this case the bars which have been cast are submitted to the test of bending, and for this purpose more or less complicated machines are used. It must not be lost sight of that raw iron of large grain which is added during the casting, to iron not possessing much silicium and graphite, has not the same resisting qualities as when iron of fine grain has been added. Further, it is to be observed, that the resistance to fracture alone is not sufficient to determine the suitability of a metal; it is also necessary to take into account the flexibility of the bar which is being thus tested. With iron which contains a large quantity of phosphorous, there is often experienced a somewhat high breaking resistance, but it breaks suddenly without having been previously subjected to a high degree of flexon. In casting a column of a similar quality of metal, there is risk of its breaking when subjected to rough shaking. Even a water pipe made of this metal may break under the shock of the water, after having resisted tests with double or triple the force of this shock. A furnace plate may also break if it is heated on one side only.

PRINDLE'S METALLIC WIRE-PACKED UNIONS.

Mr. John A. Prindle, Secretary and Treasurer of the Worswick Manufacturing Co., Cleveland, is the inventor of the very novel and effective wire-packed union herewith illustrated. Its essential features are a recess with its interior wall perpendicular and its exterior wall inclined, and a metallic wire-packing with open ends, conforming in size and shape to said recess. The shape of the recess is such as to contract the wire ring until the ends of the same meet, when the latter is pressed into the former, thus producing a perfect joint. Figures 1, 2 and 3 show sectional views of the union. The groove or seat for the packing-wire is quite plainly shown in Fig. 2. This wire is preferably of brass spring-wire, and is bent into circular form. The ends of the wire are dressed accurately, so as to abut or otherwise engage each other fairly in sectional contact, the packing-wire being of such length that the ends meet, or approximately meet when the packing-wire is laid without pressure in its seat. The ring, being of brass spring-wire, will sustain all the pressure that is likely to be brought to bear upon it without flattening the wire, by reason of which such wire packing may be used over and over indefinitely. The walls of the groove being of unequal slope, the effect is to compress the packing-ring, making it less in circumference—in other words, tending to press the ends together as the wire is forced onto its seat. Had the two walls of the seat an equal slope, there would be no such tendency as above, and consequently the claim of the inventor, that he has produced a union in which less pressure is required to make a tight joint than with any other kind of packing, would appear to be well-founded.

FIG. 1.

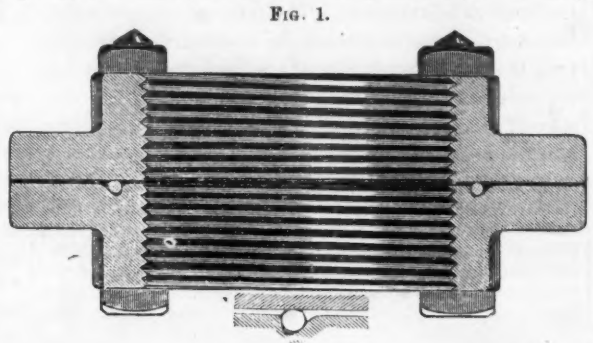

FIG. 2.

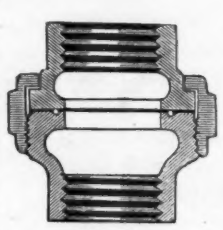

FIG. 3.

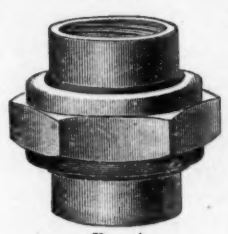

FIG. 4.

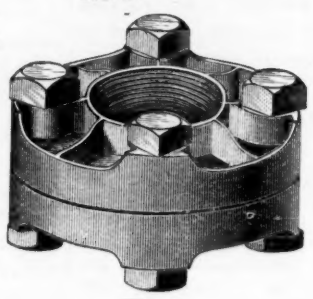

FIG. 5.

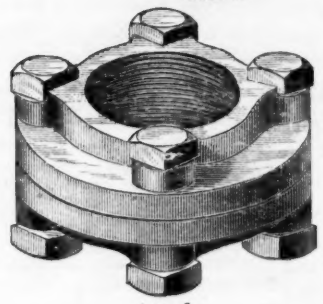

FIG. 6.

PRINDLE'S METALIC WIRE-PACKED UNIONS.

Shortage in Gas Supply.

A number of the mills in Pittsburgh suffered no little inconvenience last week by a shortage in the supply of natural gas. The shortage was only at the mills supplied by the Philadelphia Company, and was caused by the delay in laying the 36-inch connection with the Grapeville field, where the company have 12 new wells anchored, ready to be turned on as soon as the necessary connections can be made, which will probably be during the present week. The American Iron Works, of Jones & Laughlins, Limited, were partially closed down for a few days, owing to the insufficient supply of gas, but have since resumed operations in all departments.

IRON IN ARGENTINE REPUBLIC.

The Romay iron mine, in the Argentine province of Catamarca, has recently been examined by Mr. Ag. Yehen Fayenbois, a mining engineer, who has issued a report on the subject. The deposit is situated about thirteen miles from the Frias station, on the Central Northern Railway. Mr. Fayenbois found the works in a very delapidated condition, but the compass needle indicated the presence of large quantities of magnetic iron. He presently came across "two excavations still in excellent condition, and showing layers of splendid soft iron, separated by strata of calcium, carbonates, quartz and granite, all excellent materials in smelting." This magnetic iron "is the same as the Norwegian metal, containing about 70 per cent. of pure metal." He also noticed small quantities of pyrites. Good building stone and valuable slate were likewise seen. Mr. Fayenbois goes on to say:—"an inspection of the third excavation convinced me that the entire hill has a uniform system of formation of magnetic iron, at an angle of 70 degrees to the top of the hill, where the extreme points of the layers meet. The hill is 150 ft. high, with a circumference of 1,500 ft. at the base; calculating that the layers are not less than six to seven metres, four to five metres wide at the base, dwindling to one metre at the top, an idea will be gathered of the immense quantity of iron present; years would elapse before this hill would be exhausted. The neighboring hills have exactly the same formation, but in some the layers of iron are eight metres high. In some parts I saw the effects of previous explosions, the iron jutting out of the side of the hill. I was amazed to see blocks of pure iron, weighing five, three and two tons each; these would be phenomenal samples, that would attract great attention at the Paris Exhibition, which will come off next year. Few miners have had an opportunity of seeing such blocks of iron. The principal wealth of the Romay mine is beyond doubt, its magnetic iron, and the mineral can be worked with the greatest ease, as fuel and water are abundant. The wealth in these hills is incalculable, and I calculate that working at the rate of 500 to 600 tons of iron per diem, the mine would supply iron for a century to come."

A Gas Hammer in England.

Instead of steam furnishing the motive power, a mildly explosive mixture of common coal gas and atmospheric air is employed. It is used to propel the hammer piston very much as in the cylinder of a gas engine. Softer blows are given by reducing the range of movement of the hand-lever, and the force of the blow can be regulated as easily and accurately as with the steam hammer. The hammer is three-fourths hundredweight, but the ordinary blow struck by it is equal to a weight of three hundred-weights, falling through a height of 1 foot; 3,000 blows use only 33 cubic feet of Birmingham gas, which at 2s. 6d. per 1,000 cubic feet costs one penny, or 4,500 light and heavy blows can be struck for the same sum. The hammer is always ready for work at any moment, day or night, for short or long periods, and it works at the same economical rate for one blow as for 1,000. It is only necessary to light the Bunsen flame, open the gas cock, and it is ready for action. The hammer is arranged to work with hand-gear, but if preferred, it can be arranged to work with foot-gear also.

The Cost of Making Car Wheels.

E. Warne, of Easton, Pa., has printed figures, obtained from the Taylor Iron Works at High Bridge, N. J., on the cost of making car wheels. It is based on the use of three-quarters of charcoal pig at $26.50 per ton, and one-quarter old wheels, at $19 per ton, equal to $24.62 per ton for the stock, four wheels being made from one ton:

Iron	$6.16
Melting, core drying	.20
Sand, molds and cores, flour and facing	.15
Foundry labor of moulding and casting	.85
Outside work, unloading materials	.10
Repairs, wear and tear, taxes, insurance, motive power and delivery charges	.40
Cost	$7.86

With wheels selling at $8 apiece, this would leave a profit of 14 cents per wheel.

THE iron ship-building company at Newburgh has sold its entire plant with machinery to the Chesapeake Dry Dock Construction Company, and will be transferred to Newport News, Va.

THE
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THE METAMORPHOSIS OF A RAILROAD.

Whatever the advantages of a narrow gauge railroad in a new or mountainous country, it cannot long hold its own in the midst of a labyrinth of roads of the standard gauge. Its change to the latter is only a question of time, and that question was answered, in a very substantial and tangible manner, in the case of the Cleveland, Canton & Coshocton Railroad, on Sunday, November 18. As the change puts this road on competing terms with the best-equipped roads in Ohio, and is therefore of considerable importance to the commercial and industrial interests of Cleveland and other Ohio cities, a brief reference to the work accomplished, and its probable results, may be in order.

It took 1,150 men thirteen hours to spread the rails on the entire length of the road. The track was divided into sections three and a half miles, and to each of these sections was detailed a gang of twenty-eight men, whose duty it was to set out the rails and put the track in good running order as soon as possible. To expedite the work, half the spikes were drawn before Sunday's work began. The foremen in charge of these gangs were all experienced men at this kind of work, and apportioned the men to the various duties of pulling spikes, setting back the rails, spiking down, finishing up. As fast as the rails were set back, they were gauged to see whether they were located the proper width, etc. Other gangs of men were busy putting in crossings, frogs at sidings and filling in gaps generally. The labor bill for the day was about $4,000, and the amount thus far expended on account of the improvement, is about $600,000. Something like $1,200,000 remains available for completing the work and the new equipment.

By this change 1,000 cars, 26 locomotives and 32 coaches are displaced from service, and in their place a splendid equipment of new rolling stock has been placed on the road, as follows: Twenty-two engines, the passenger engines weighing 38 tons (cylinders 15x 24″, drive wheels 5½′ diameter), the freight engines weighing 52 tons (cylinders 19x24″, drive wheels 4′ diameter), the yard engines weighing 40 tons; twenty-six Pullman passenger coaches, fifty-six box cars, 100 flat cars, and 800 coal cars, the latter having a carrying capacity of 25 tons each. All the locomotives are supplied with the latest improvements, from steam bell-ringers to air brakes. The coaches are heated by steam.

The formal opening of the metamorphosed road occurred on November 22, when leading railroad men from various parts of the country enjoyed the hospitalities of the company, and witnessed a very interesting industrial parade in Canton, in celebration of the event. Movements are on foot which may result in working arrangements whereby the Baltimore & Ohio Railroad will secure entrance into Cleveland over this road.

THE New York *Tribune*, whose prospectus appears elsewhere, is pre-eminently the business men's paper of the country. It is always right on great economic questions.

MANGANESE MINES IN SANTIAGO DE CUBA.

United States Consul Reimer, in an interesting report to the Department of State, gives a very full account of the manganese mines of Santiago de Cuba, from which we extract the following points of importance to American steel manufacturers:

Land of the mines, so far as discovered, is worth on the average from $3 to $6 per acre. The Spanish Government, under date of June 30, 1887, by royal decree, has ordered that manganese mines are exempt from all manner of taxes for twenty years. All material, machinery, tools, etc., to be used in the exploitation of manganese ore are free from import duty. Railroad material, machinery, coal, etc., for mining purposes are all free from import duty. The mining railroad is free from taxes for ninety-nine years. Thus far 1,300 tons of manganese ore have been shipped to the United States.

The company working these mines is called the Cuba Manganese Company, New York, incorporated under the laws of the State of New York and recognized by the Spanish Government. The mines so far have only been worked to demonstrate the feasibility of exporting from them large quantities of ore, and the amount thus expended has reached the sum of $40,000. A fair estimate of the present cost of this ore put in Philadelphia is as follows (price per ton in Spanish gold):

Royalty paid to owners of the mine	$1.10
Cartage, 2 miles, from mine to railroad	1.25
Freight, Cristo station to Santiago de Cuba	1.27½
Bagging	3.25
Lighterage and labor in Santiago de Cuba	.60
Freight to Philadelphia and discharging there	3.68½
Mining ore, including labor, salaries and expenses at mine	4.65
Actual cost of 1 ton of ore	$15.81

This, at $1.10, would make $14.23 in United States currency. This is an enormous expense, and the company, now that the ore has been proved to exist in large quantities, proposes to reduce it to half, by either making a rope tram-way from the mines to Cristo station, or else building a branch railroad to connect with the Sabanillo & Marote Railroad, and avail itself of an existing Spanish law, and compel the Sabanillo & Marote Railroad Company to allow the company's ore cars to pass over their track. Then the company proposes to erect a dock of its own where its steamers can load the ore. The mines are worked by open cuttings or drifts on the sides of the hill. The analysis of the ore so far shipped, has shown an average of—

Silica	.810
Iron	.300
Metallic manganese	56.880
Phosphorus	.030
Sulphur	.013
Moisture	2.000
Total	60.023

No doubt American push will soon put this ore on the market at a figure that will effect a ready sale.

Scribner's Magazine completes its second year and fourth volume with a Christmas number containing nineteen interesting articles in prose and verse—twelve of them fully illustrated by well-known artists and engravers. Among the artists represented, are Elihu, Vedder, J. Alden Weir, W. Hamilton Gibson, John La Farge, Robert Blum, George Hitchcock, C. Jay Taylor and M. J. Burns. The number is rich in beautiful decorations and pictures. The literature deals with unusually attractive phases of life and art, especially fitted for the Christmas season. The fiction includes stories of adventure and sentiment; the general articles treat of stained-glass windows, the Adirondacks in Winter, and Botticelli; there are several elaborately illustrated poems; and Lester Wallack's reminiscences are concluded. Robert Lewis Stevenson, H. C Bunner, Will H. Low, Rebecca Harding Davis and Hamilton Wright Mabie are among the contributors.

The *Cosmopolitan* (New York) is rapidly forging to the fore as a representative American magazine. It is a marvel of typographical neatness, and its illustrations are always good. The November number is remarkable for timely articles from Senator Wm. P. Frye, Judge Allen G. Thurman and Joseph Howard, Jr. In general literary merit, it ranks well.

THE SANDUSKY ENTERPRISES.

Substantial progress has been made, during the past thirty days, in forwarding the extensive railroad, dry-dock, and ship-building projects projected at Sandusky by Mr. W. D. Crane. We understand that Eastern banks have examined into the merits of these improvements and have signified their approval in aiding the negotiation of the sum of $15,000,000, which is the contemplated cost thereof. On the next page is shown a midship cross-section of the first proposed drydock, plans of which were received from New York the past week. Following is a description of the same:

The line of excavation is the bottom line of concrete, as shown in the cut. German Portland cement will be used. Great care will be taken in preparing the concrete, and not more than one foot per day will be laid so it will be firmly set.

DIMENSIONS.

Length, inside measurement, 400 feet.
Width, inside measurement, at top, 72 feet.
Width, inside measurement, at bottom, 40 feet.
Depth on mitre sill, 13 feet.

EXCAVATIONS.

Length, more or less, 425 feet.
Width (at top), more or less, 80 feet.
Width (at bottom), more or less, 58 feet.
Depth, more or less, 16 feet.

Sectional area is 122 square yards, approximate excavations 16,267 cubic yards. Short piles, 10 feet long, will be driven at intervals, the length of the dock at its bottom, to afford a true and absolutely firm base for the keel blocks. Stone slabs will be placed on the top of these short piles, and the concrete built around and over, forming a perfectly smooth and firm base. The nature of the soil is exceedingly favorable to this mode of structure. The entrance to the dock will be of stone, with a caisson gate of improved form. Blake's duplex pump will be used, which has a capacity of nearly 5,000 gallons per minute.

A dock constructed on the above plan will be simple and durable, and there will not be anything on the chain of lakes to compare with it. Dry dock No. 2, which will be known as the "Meta" dry dock, will be built on the same general principle, with such improvements as experience with No. 1, or "Mary" dry dock, may suggest. The Blake duplex pump is designed to work both docks.

The plans for the ship yard structures have also been brought on from New York. They comprise office buildings, mould loft building and the main machinery structure, the latter over 800 feet long.

Now that these projects are well under way, it may be well to briefly outline them, for the benefit of the public at large:

Early in the Spring of 1887, the attention of the projector, Mr. Walworth Douglas Crane, was called to the vast and increasing volume of heavy traffic passing from east to west and *vice versa* on the Great Lakes. His attention was centered upon the volume of ore traffic shipped from the Northwest mainly to the Ohio lake ports. The tonnage of iron ore had grown from small beginnings, commencing in 1854 with a total output of 3,000 tons, and in 1886 reaching 3,583,954 tons, the year 1887 exceeding this figure by nearly one millions tons. Up to this date, it is evident the product of 1888 will closely approximate five million tons. All of this from the Northwestern shipping ports of Michigan, Wisconsin and Minnesota. Mr. Crane quickly foresaw that what was needed was a systematic mode of moving this heavy freight, and at a low, uniform cost. It was not only iron ore, but the great grain-producing areas of the matchless Northwest, seeking the Atlantic seaboard, attracted his attention, and were also shipping millions of bushels of grain, and grain converted into flour, via the Great Lakes, whilst *per contra*, the black diamonds, namely, the anthracite from Pennsylvania, the bituminous coals from the extensive Ohio coal fields, were being laden into the ore vessels as the west-bound or return cargo to the Northwestern ports. The system has in view the economical handling of a portion of this large tonnage, and in this connection the contemplated improvements have an important bearing.

What are now currently known as the Sandusky Enterprises, are as follows, and, in order named, they form the links of a great chain of improvements:

GREAT LAKES TRANSIT COMPANY.

The directory of this, as well as the associated companies, is composed of well-known and prominent bankers and merchants of Chicago, Sandusky and New York. This company will construct at their own ship-

yards, at Sandusky, a fleet of steel ore carriers and consorts. The steam portion of the fleet will consist of steel built, heavily powered vessels, having an engine power capable of developing 1,700 I. H. P. for each of the vessels, and a carrying capacity of 2,800 gross tons of iron ore. The consorts or sailing vessels built of steel, will be fully equipped with such auxiliary steam appliance as steam windlasses, steam capstan and steam steering gear and heavily sparred, with a cargo capacity of 3,150 gross tons each. These vessels will load under time contracts which have already been made for fifteen and twenty year periods, at a guaranteed rate of freight for the term, at the various shipping ports and deliver their cargoes to any of the Lake Erie ports as consigned, returning light to port with water ballast only. This system of double, or water balast bottom having been first introduced into the United States by the projector of these enterprises, in his pioneer steam collier "Rattlesnake," projected and designed for the Philadelphia & Reading Railroad Co. in 1868 and 1869. But the principle of returning in ballast was a new feature, and Mr. Crane has demonstrated that this was the true secret of the economical handling of coarse freights.

Under an ordinance granted by the city of Sandusky, in October, 1887, these enterprises became the owners, by a perpetual grant, of what is known as the East Battery water front, which led to the formation of

THE EAST BATTERY TERMINAL & WAREHOUSE CO.

This property when improved will cover an area of eighty-five acres, with five piers radiating from the shore bulkhead, from 1,400 to 2,800 feet in length extending out to the new government straight channel. The net-work of railway tracks on the piers and terminal property aggregate nearly twenty-two miles in length. Upon these piers or wharves will be erected the grain elevators, of 750,000 bushels capacity each, coal pockets, storage sheds and various other structures for handling any business which may come to the port. Steam appliances of the most improved form have been specially designed for these wharves, and the plan is that of Mr. Wm. Parsons, C. E., of New York, who is chief in charge of the improvements as well as those of

THE SANDUSKY, ASHLAND & COSHOCTON RAILWAY.

This corporation passed into the control of Mr. Crane in June, 1887, and was reorganized, and its new organization comprises many well known Ohio names. Mr. G. Clinton Gardiner is president of this corporation, as well as the East Battery Terminal & Warehouse Co. the second of these enterprises.

The railway has been surveyed to the town of Coshocton, distant about 120 miles, and passing through the most fertile portion of Ohio, through the towns of Milan, Norwalk, Ashland, Loudonville and Warsaw and to the terminus at Coshocton, connecting there with the Pan Handle system of the Pennsylvania lines west of Pittsburgh, and at Loudonville with the Fort Wayne division of the Pennsylvania Company.

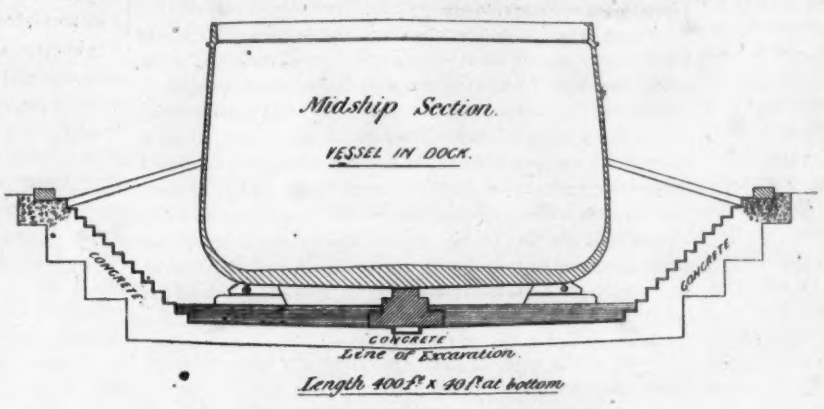
At or near Warsaw the short coal line known as the Walhonding & Mohawk Valley R. R. Co. is projected into the Mohawk Valley, penetrating the rich coal field of the townships of Bedford and Jefferson, where over 3,000 acres of the choicest cannel and bituminus coals Nos. 5 and 6 have been secured by the kindred and associated companies in fee.

One other organization has been formed, which will be the owner of what is known as the Pipe Creek Terminal property, on which it is proposed to erect the ship yard and dry docks. A space of seventy-five acres has been alloted for the ship yard plant and dry docks. The latter will be two in number, 400 and 350 feet long respectively, and built entirely of concrete, for which the site and nature of the soil is most admirably adapted.

The ship yard plant will be constructed by one of the most eminent engineering works in Scotland, and erected on this property and in position prior to February, 1889. All the architectural drawings for the buildings which are to be erected on the ship yard site have been drawn by G. N. Vickers, architect, of New York, under the personal superintendence of Mr. James Guiler, naval architect and general Superintendent of Sandusky Ship Building Works.

The remaining portion of the Pipe Creek property will be devoted to storage yards and the various betterments pertaining to this vast and comprehensive enterprise, which, it is predicted, will surpass in extent and in its ramifications any improvement of like nature now extant on the great chain of lakes.

The "Mary" Dry Dock.



THE SANDUSKY TERMINAL IMPROVEMENTS.

An Electrical Fire Engine.

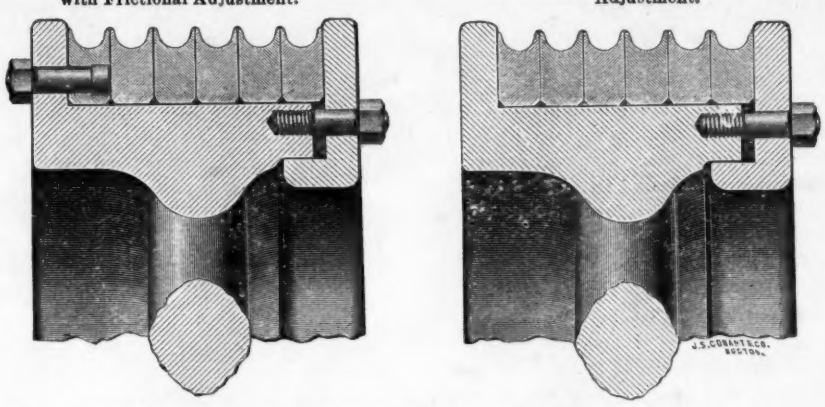
About the most recent invention for the application of electricity is Prof. Wheeler's electrical fire engine. It is intended to be worked by the current of any of the overhead electric light wires. The principal difference in the invention to the ordinary steam fire engine is that the power is obtained from a motor instead of the steam chest. Each of the new engines will carry a reel of some 500 feet of insulated, fine copper wires, bound together cable fashion, so as to equal in strength a No. 3 wire, for the transmission of the current. As by this method the engine can be placed anywhere, as the wires overhead can be tapped anywhere, the engine will be placed nearer the fire than by the old method. The powerful current of an arc light wire will not be required, that of the ordinary incandescent circuit being of sufficient potential to run the motor.

The advantages claimed for this new method are many. In the first place, it is much lighter, and much greater speed can therefore be attained. Again, owing to the construction, it can be built for about one-third of the cost of an ordinary steam fire engine. A very important consideration is that, like all motors, it starts up immediately under full speed. It is safer and easier of control. It is noiseless and is much more economical. That this last point is true is perfectly evident. The expense for fuel for the present engine in use is considerable. By tapping the wires overhead fuel is provided gratis. The above advantages are claimed by the inventor, and many of them seem important, and if the claims can be substantiated, the invention will soon be in universal use.—[Boston Commercial Bulletin.

"DUNRAVEN RANCH" is the name of the new novel which Captain King contributes to the December number of *Lippincott's Magazine*, said to be the best story he has yet produced. The serial "At Last: Six Days in the Life of an Ex-Teacher," by John Habberton, is full of humor and interest. Thomas Leaming has a valuable article on "Trust and Title-Insurance Companies," in which the growth and development, the uses and possible abuses of these novel institutions are treated from an abundance of knowledge.

LEADING DRUM.
Having initial ring secured and 5 loose rings with Frictional Adjustment.

END DRUM.
Having 6 loose rings with Frictional Adjustment.



Patented July 31, 1888, in United States, Canada, Great Britain, France, Germany, Belgium.

Wrench for Producing and Measuring Frictional Adjustment of Rings.

FIG. 3.—WALKER'S PATENT DIFFERENTIAL CABLE DRUMS.

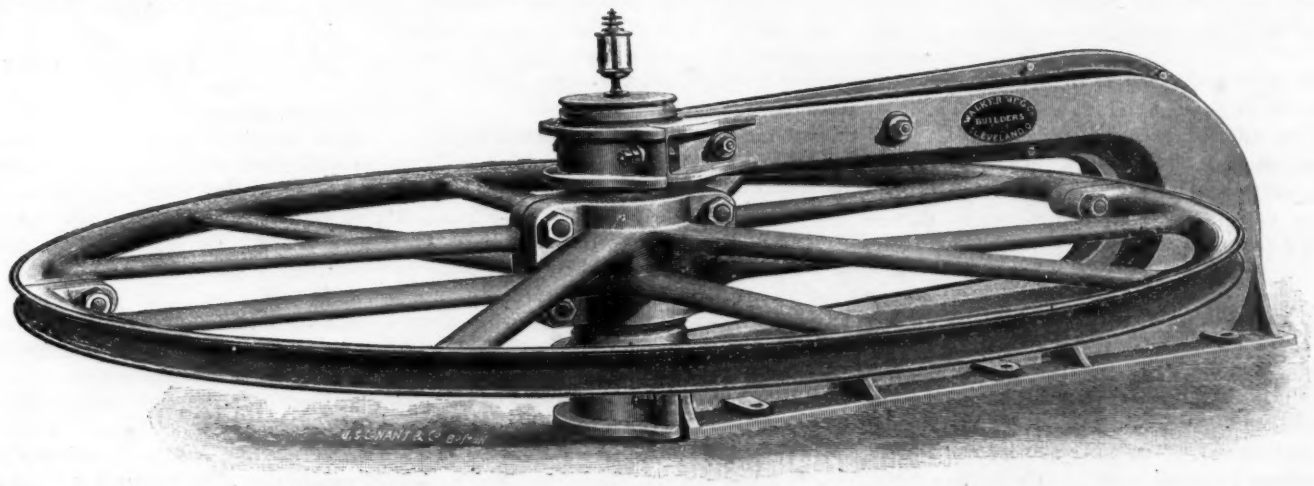


FIG. 2.—U FRAME AND SHEAVE WITH STAGGERED ARMS FOR CABLE RAILWAY WORK.

IMPROVED CABLE MACHINERY.—(See first page.)

AGENCIES.
NEW YORK, 109 Liberty street.
PHILADELPHIA, 2035 N. Front st.
MINNEAPOLIS, 210 South Third st.
CHICAGO, 218 Lake street.
ST. LOUIS, 707 Market street.
NEW ORLEANS, 21 Union st.

THE CURTIS

Regulators for Steam, Water, Air, and Pump Pressure.
STEAM TRAPS, RETURN TRAPS, DAMPER REGULATORS, SEPARATORS,
and other Specialties for the economical use of Steam. Manufactured by
THE CURTIS REGULATOR CO.
85 Beverly Street, Boston.

OUR STEEL-PLATED SHIPS.

A Washington correspondent of the New York *Commercial Advertiser*, says that accounts from the United States steamer Dolphin, flagship of Rear Admiral Kimberly, commanding the Pacific squadron, and at present undergoing repairs at the Mare Island Navy Yard, would seem to indicate that the action of salt water on the bottoms of steel vessels, tends toward rendering them unserviceable for sea duty ifi a much shorter space of time than was calculated upon. The rust and galvanic action combined, have already made little indents in her plating to a depth of three-sixteenths of an inch, which in plates originally only seven-sixteenth of an inch shows that considerable care will have to be taken with the vessels of the new steel navy that are destined to cruise for a considerable length of time in the waters along the South American coast without having an occasional docking and repainting.

The Dolphin is by no means the first vessel that has suffered from this cause in the waters of the Pacific, which seem particularly bad in their effect on steel or iron craft. All the steamers of the Pacific Steam Navigation Company trading on that coast, as well as the Pacific Steamship Company's vessels, have to be docked and painted at least three times a year. The Chilian men-of-war are likewise great sufferers in this particular, and are docked every four months, at each of which times four coats of anti-fouling paint are applied. The result in the case of the Dolphin will probably be the replacing of her water-line plates by thicker metal, or the covering of the present armor by a belt of plates extending a space somewhat above and also below the water-line. The "pitting," as it is called, extends along the vessel's water-line, being worst amidships and tapering towards the ends, and all this, notwithstanding the fact that the vessel was heeled over and painted wherever practicable during her stay in the different ports.

At the time of the fitting out of the first Roach cruisers, the Dolphin and Atlanta, the Navy Department was of the opinion that a mixture of red lead and white zinc was the best composition for the bottoms of men-of-war. This opinion was not formed hastily, but was the result of a long series of experiments with plates allowed to remain quite a number of months under water. Latterly, however, much attention has been paid by the makers of varnishes, paints and other compositions to the subject of a composition that would be satisfactory and at the same time prevent any galvanic action operating on the metal bottoms. Many articles on the market for that purpose have been made either in ignorance or defiance of galvanic laws, and have resulted in serious injury to the bottoms they purported to protect. All kinds of things have been used in making these preparations, and among the articles employed have been celluloid and Japanese-lacquer. The latter, from recent reports, seems to have proved very efficient.

At present a paint manufactured by McJames & Co. seems to be the best for the purpose, and the steel cruiser Boston had three coats applied to her bottom before leaving on her present cruise. The Atlanta and Chicago are to be similarly treated. The first two coats are brown in color, a principal ingredient being oxide of iron for the two brown coats first applied, and sulphate of copper is prominent in the third coat, green in color and anti-fouling in its action. Mr. Lewis, a high English authority, states that the best anti-fouling composition of the future will be a sound gum dissolved in a volatile solvent with a body formed of finely divided metalic zinc. The varnish will remain for many months, but when it finally succumbs to the action of the salt water, as it must do eventually, the zinc will remain and prevent the corroding action of the salt water on the iron, thereby protecting the ship's bottom better than any anti-fouling compound.

Another method of protecting the bottoms of steel vessels is by first sheathing them with wood and afterward covering the wood with copper sheets. This method was adopted years ago, but latterly, when everything was given way to great coal capacity and high speed, the matter has not been actively pushed. Recent contracts, however, made by foreign Governments for cruising vessels has again revived the subject, and there can be no doubt that for a nation without docking facilities away from its home ports, the extra weight of the sheathing, which at first may take away something from the weight of machinery will, in long cruising, especially such as is done on the Pacific coast, enable a vessel to make more satisfactory voyages and to remain longer in a sound, efficient state than would be possible when reliance has to be placed solely upon anything thus far used in the way of an anti-fouling composition.

THE WORLD'S FUTURE FUEL.

Some of the leading journals of the day have recently been speculating on the probable exhaustion of anthracite and other coal in the United States, assuming also that the world's supply of coal must be chiefly obtained from this country. We have been looking up the subject and find that there are large bodies of undeveloped coal territory in the Netherlands, Switzerland, Sweden, Denmark, Germany, Bohemia, Siberia, Hanover, amounting to 59,000 square miles and Russia with 22,000 square miles. The Island of Formosa can furnish 10,000 square miles of coal. At Pekin there are seams of coal 95′ in thickness. Large coal territories abound in Austria, Spain, S. W. Poland, Portugal, Italy, Greece, Turkey, Persia, amounting to over 39,000 square miles, to which we may add 35,000 square miles for India, and 400,000 to the credit of China. Japan is capable of furnishing 6,000 square miles. Then we take the Falkland Islands, Patagonia and Peru, where there are very extensive deposits of coal. Most of the southern part of Chili is a vast coal field. Then comes Brazil, an immense empire, having coal beds from 17′ to 25′ in thickness. In the United States of Colombia there is cretaceous coal of fair quality and bituminous beds far beneath the surface. Then we must make a note of Mexico, Vancouver's Island, New South Wales, the latter 25,000 square miles.

To these we add Queensland, Victoria, Western Australia, good for 14,000 square miles. New Zealand can furnish 29,000, and then we have not counted on Tasmania, New Caledonia, Natal, Alaska, and still other undeveloped parts of the world, making an addition of at least 100,000 square miles.

It must be remembered that all the carboniferous areas enumerated are undeveloped and known only to geologists. We do not mean by this that geologists are wiser than other people, but such matters come within the line of their profession, and geology is a study of such colossal magnitude that very few persons give it any attention. In this estimate we have not included any of the working operations of the world, nor of any coal lands in North America, excepting Alaska and Mexico, nor have we delved into the carboniferous strata of Africa. It will thus be seen that the world's future supply of fuel is not likely to be exhausted within the next 100,000 centuries.—[Altoona Times.

Reward for a Champion of Protection.

A Philadelphia special to the New York Tribune says: It is current talk in the iron and steel trade of this city that James Swank, manager and principal writer for "The Bulletin" of the Iron and Steel Association, of this city, is to be substantially rewarded by the incoming Administration for his great help in the cause of Protection. Mr. Swank said this afternoon: "I am gratified to learn that my services in behalf of the protective policy have been satisfactory to those who have knowledge of the difficult task the President's message and the Mills bill set before all earnest Protectionists. While an office might not be objectionable, especially in the line of my experience, my present office with the Iron and Steel Association satisfies my tastes, and I would not without careful consideration, part from the friends who have conferred it upon me." In addition to recomending his appointment to a suitable position under the Government, there is talk of the maufacturers making a personal testimonial of their appreciation of Mr. Swank by presenting to him a $10,000 house.

ASBESTOS.

Asbestos or asbestus (from a Greek word meaning unconsumable) is a variety of hornblende. Indeed, the word is applied to several varieties of the hornblende family which readily pass into fibrous forms. It consists of long fibres, fine, crystalline, and elastic, with a silky lustre, and easily separable by the fingers. It derives its name from being especially indestructible by fire. A single fibre of asbestos may be fused to a white enamel, but in the mass it is capable of resisting ordinary flame and heat, and for this reason has always been regarded with much interest. It forms, when woven into cloth, an incombustible texture, which only needs to be thrown into the fire to be cleansed. Charlemagne is said to have had a table cloth made of it, which he used to have thrown into the fire after dinner, to the amazement of his guests. The ancients were familiar with the incombustible qualities of asbestos, though they were so ignorant of its origin as to suppose it to be a vegetable substance. They wove cloth of it for the purpose of wrapping the bodies of the dead on the funeral pyre, in order to keep their ashes separate from those of the wood of the funeral pile; they also made napkins of it, which were cleaned by throwing them into the fire, and they used a fine variety for the wicks of votive lamps, which were never allowed to go out. There are several varieties of asbestos. Amianthus, so-called from a Latin word meaning undefiled, is the rarest and most delicate kind, its fibres being very white, long, and delicate. It is found in the Pyrenees, in some parts of the Alps, in Sweden, in the Ural mountains, in Silesia, and New South Wales. Some very fine deposits have been recently discovered in Canada. The most beautiful specimens come from Tarentaise, in Savoy, and from Corsica.

Common asbestos is darker in color and heavier than the variety named, and is more brittle and irregular in structure. In the blow-pipe it can be fused with difficulty. It is found in parts of England and Scotland, and occasionally elsewhere. Mountain leather and mountain cork are two other inferior varieties; in color a dirty white or brown. Mountain leather is in thin, flexible sheets, and mountain cork takes its name from being not unlike common cork, and so light as to swim on water. These are found in some parts of England. Mountain wood is a soft, tough, opaque-brownish colored variety of asbestos, much heavier than the others, and melting to a black slag in the blow-pipe flame. This is found in the Tyrolese Mountains and in Scotland. More success has attended the use of asbestos for fire-proof roofing and flooring, for a non-conducting envelope for steam in steam-pipes, and for the packing in fire-proof safes. It is also used to great advantage in the packing of pistons in steam engines, and for fire-proof paint.—[Inter Ocean.

Displaying Cutlery.

A State street cutlery dealer was telling a Chicago reporter recently of the wonderful variety of pocket knives he carries in stock. "You see this show case," said he, "well, in this case I have 1,300 styles of knives." "You don't mean 1,300 patterns, but 1,300 styles, counting variations in sizes?" "Yes, but I have at least 800 patterns. See that ball outside, he added, pointing to a ball about a foot in diameter hanging in a glass case in front of his store. "In that ball there are 300 knives, no two alike. By the way, that ball was the best investment I ever made. I wanted something to stick knives in, and I asked several workmen to get me up a ball like that. I had a good deal of difficulty in getting a man to take hold. Finally I found one who would make it, and he said there was only one way in which it could be done, and that was to make a ball as nearly round as possible, and then cut and mitre and fit small pieces of cork and glue them to the surface. He was several days at the job, and when he had finished, I had a perfectly round ball, with a soft surface, to stick knife blades in, and a bill of $30 to pay. But that ball has increased my trade at least 25 per cent, and if I could not get another one any cheaper, I would give its weight in gold for one.".

Industrial Notes

Blast Furnaces:—

A blast furnace and puddling mill are contemplated near the junction at North Brownville, Maine.

It is rumored that negotiations have been concluded for the erection of a furnace at Leeds, Ala., with 120 tons daily capacity. Henry Ellen coke is to be used as fuel. H. F. DeBardeleben, B. F. Roden and J. F. Johnson are said to be at the head of the enterprise.

The furnaces of the Jackson Iron Company, at Fayette, on the north shore of Lake Michigan, are to be closed down during the coming winter. This step is made necessary by the scarcity of fuel within easy hauling distance of the furnaces, which have been in operation for many years, and have used the charcoal made from the timber cut from the lands of the company for a radius of ten or twelve miles from the furnace.

Through an accident at the Himrod blast furnace, which is under lease, the Mahoning Valley Iron Company will lose thousands of dollars. Ten days ago, the rim at the top of the furnace broke and allowed the bell to fall. Sufficient heat could not be kept up underneath, and the furnace as a consequence has chilled above the tuyers. Men have been engaged night and day and barrel after barrel of oil has been used, but still it has been impossible to make a blast. The furnace is now being heated around the outside, in the hope of getting up sufficient heat.

Recently the United States Rolling Stock Company, of Anniston, Ala., did a remarkably quick piece of work, concerning which the *Tradesman* gives the following details. "The bell at Woodstock Furnace No. 2 having fallen in, another had to be made. At 2 o'clock P. M. the metal was still in the shape of pig iron, and the large casting was made, taken to the machine shop and turned, and then drilled and delivered to the Woodstock Company at their furnaces before 4 o'clock A. M. Considering the size and shape of the casting, and the difficulty of handling and fastening it to the lathe, much credit is due for the exceedingly short time required to do the work."

The Ohio & Western Coal & Iron Co. blew in one of their new furnaces, at Floodwood, O., on the 4th inst. Coke is used for fuel, and the ores are a mixture of Lake Superior and native. They will make both a strong foundry and an open soft pig iron. The furnace is now running very successfully. The constructors guaranteed 125 tons of iron daily, and the indications are that the output will be much above that, using these materials. The furnace plant at Floodwood consists of two stacks, but it has not yet been determined when the other one will be blown in. These furnaces are 75 feet high and 17 feet in diameter at bosh, and have four Mackintosh & Hemphill blast engines, with 48x84-inch blowing cylinders. One furnace is equipped with fire-brick stoves and the other with iron-pipe stoves. The company also own the Helen Furnace, at Orbiston, and the XX Furnace at Shawnee. The four stacks combined will have a capacity of 300 to 350 tons of pig iron daily. Pickands, Brown & Co., of Chicago, and Pickands Mather & Co., of Cleveland, Ohio, are agents for the sale of the entire product now being made.

Rolling Mills:—

Zug & Co. will soon begin to tear down seven tenement houses on Pike street, and will erect twelve new puddling furnaces on the site.

The Tyrone Iron Company, of Tyrone, Pa., shut down their entire plant recently, for the purpose of rebuilding two regenerative gas furnaces. They are also putting up a new building, 60x35 feet, over the gas producers and building an entire new wing to their dam, 120 feet long.

The rolling mill of the Tamarack-Osceola Copper Manufacturing Company, at Houghton, Mich., is rushed with orders. A shipment has just been made of 150 tons wire rod. A new furnace has just been added for the 108-inch rolls, and a set of 20x60 cold rolls is being erected. Much of the machinery for the new wire mill has already arrived on the ground.

Ten of the boiling furnaces at Kelly's mill went on this Tuesday morning, thus giving employment to 40 additional men at the mill.—During the past year, the consumption of sheet iron for building purposes, doubled. It is one branch of the iron industry where the demand keeps up with the product. As an incident of the brisk demand, a representative of a Pittsburgh firm was here recently to sell roofing material, and seeing a small lot of sheet iron in the shop of a consumer, he tried to persuade the Ironton man to fill an order he had, saying there was more iron there than his firm could then command.—[Ironton (O.) Register.

Steel Works:—

During the month of October, just closed, the plant of the Wheeling Steel Works, at Wheeling, W. Va., produced 6,834 gross tons of Bessemer Steel.

The Scranton Steel Company, of Scranton, Pa., on November 12, made 464 tons of ingots in 73 heats in 12 hours, rolling 428 tons of rails in the same time.

The Cambria Iron Company's new Bessemer steel works will be completed and ready for operation by January 1st. They will have a capacity of from 1,000 to 1,500 tons per day. Upon the completion of the new works, the old works will take a rest.

The Bessemer Iron & Steel Company, on the 16th inst., filed in the office of the Probate Judge, of Jefferson County, Ala., a mortgage in the sum of $500,000, securing first mortgage bonds. The purpose of the loan is to invest that amount in improvements in and about the company's present plant, and to increase the present facilities for making iron.

Mr. Abraham Reese, of Pittsburgh, has organized a company to build a steel rail mill, at Hartford, Ind. In addition to the manufacture of steel rails, the company will use a patented process, owned by Mr. Reese, for the re-rolling of old rails. In passing through this process, the old rail will be reduced somewhat in size, and will be intended for the construction of narrow-gauge railroads.

The Bethlehem Steel Company, of Bethlehem, Pa., is about ready to start up its works. This company has the contract for supplying the forgings for the eight, ten and twelve-inch guns for the navy. It has recently erected a steel plant costing over $1,000,000, and now that its manufactory is in running order, it is expected that the forgings will be sent at once to the Washington Gun Foundry, where the guns will be constructed.

The Chief of Ordnance of the U. S. Army, has been directed to invite proposals for all materials required for the steel forgings for heavy ordnance. The proposals call for 25 sets of steel forgings for 3.2 in. guns; forgings for 1.12-in. breech-loading rifle; 27 cast-iron bodies for 12.in. mortars; 27 sets of steel forgings for hooks and breech mechanism; 12-in. mortars; for furnishing, assembling and manufacture of 27 breech-loading mortars, and for complete sets of forgings for 8-in., 10-in. and 12-in. guns. The number of the class of forgings last mentioned is not specified, but the total price to be bid is about $1,455,000. The number of sets of steel gun forgings must not be less than 21 for 8-in. calibre, 22 for 10-in., and 14 for 12-in.; any increase proposed by bidders in the number of sets to be furnished will be evenly distributed. Bids for the gun forgings are to be opened Dec. 20; for the manufacture of mortars, for steel forgings, for hoops, etc., of mortars and for cast-iron bodies of 12-in. mortars on Dec. 15, and for the 3.2 in. forgings and single 12-in. forging on Dec. 11.

Machine Shops and Foundries:—

November 16, Rathbone, Sard & Co., Albany, N. Y., shut down Nos. 2 and 3 of their stove foundries for an indefinite time, owing to overproduction and depression in trade. This shuts about 200 men out of employment. It is rumored that another foundry will be closed before long.

The Hoppes Manufacturing Company, Springfield, Ohio, shipped, during 30 days in October, about 5,000 horse-power in feed-water heaters and purifiers, and 2,500 horse-power in exhaust steam heaters. Several were to fill from the second to the fourth order. They report a very flattering outlook for future trade.

Some time since, the Crosby Steel Gauge & Valve Co., built a new factory at Charlestown, by which facilities for manufacturing its specialties were greatly increased. The company has now enlarged its salesroom and office at 93 Oliver street, Boston, and will carry a full stock of its own products, and also complete lines of engine and boiler supplies. The sales from its London store are very gratifying.

L. S. Allison, proprietors of the Hazelton Iron Works, at Hazelton, Pa., has recently purchased and put in operation the plant of the Minersville Iron Works, at Minersville, Pa. The plant is composed of a machine shop 155 feet long and 70 feet wide, a foundry 70x80 feet, containing two cupolas, a forge 150x50 feet, and a boiler shop 70x35 feet. The works will be run on furnace machinery, castings, rolling mill machinery, mine locomotives, mine pumps, hoisting engines and steam shovels, and all kinds of mine machinery and castings with structural work and forgings. Employment will be given to about 150 men.

The Davenport Foundry & Machine Company, of Davenport, Iowa, are quite busy getting out ten fly-wheels, 14 feet diameter, weighing each about 18,000 pounds; ten large disk cranks and couplings, etc., for the Davenport Water Company; also a large lot of castings for the Hawkeye Electric Mfg. Company, who are locating at that place. They will have their works in operation December 1.

The Gordon & Maxwell Pump Company, Hamilton O., are making three sewage pumps for Hyde Park, Ill., with aggregate capacity of 9,000,000 gallons, two water works pumps for Troy, Ala., with capacity of 2,000,000 gallons, and two for Gladwin (Mich.) Water Works, with a capacity of 1,000,000 gallons. The company have thus far this year sent out over forty pumps for water works in various parts of the United States.

The Kilby Mfg. Company, of Cleveland, have the contract for the machinery of the Cable Railway Company, of Los Angeles, Cal. Three of the wheels have the following dimensions: One is 26 feet in diameter, with 56-inch face, one 20 feet in diameter, with 50-inch face, its weight being 60,000 pounds, and one 24 feet in diameter, 60-inch face, weighing 80,000 pounds. The Kilby Mfg. Company are crowded with engine orders, are working day and night force, employing 400 men.

The foundation of the United States Rolling Stock Co.'s new foundry, at Anniston, Ala., 200 by 125 feet, has been laid. This will be followed by the rolling mill, the car shop, which is to be nearly 1,000 feet long, and the other new buildings for which the ground is being cleared. By early Spring the new buildings will, it is expected, be all finished. The company has decided to build two large saw mills, one in Alabama and one in Mississippi, to cut timber from its own land for use in the car works.

A large patented screw power testing machine of 100,000 tons capacity, with all the recent improvements, has just been erected in the United States navy yard, Boston, Mass. It was built by Messrs. Riehle Bros., Philadelphia, the same firm who supplied the testing machine to the United States navy yard at Mare Island, Cal.; also to the naval academy at Annapolis, and the United States military academy at West Point. Messrs. Riehle Bros. have furnished in all nearly 30 of their testing machines to the United States government alone. The machine at the Boston navy yard, above referred to, was critically examined and reported upon, by a special board of naval engineers, appointed by G. W. Melville, chief of the bureau of steam engineering, which was very favorable.

Hardware:—

James Mann, the axe manufacturer, at Lewistown, Pa., has given his employes notice of a 10 per cent. advance of wages, to take effect on December 1.

A license to incorporate under the laws of Illinois has been granted to the Leroy Crucible Steel Horse & Mule Shoe Company, East St. Louis. The authorized capital is $200,000. The incorporators are J. Leroy, Selma Watson, William Willis and W. C. Morgan.

Miscellaneous:—

Incorporated: The Iowa Feed Water Heater & Purifier Co., Des Moines. Capital, $50,000. L. E. Bleyer and others, incorporators.—Vulcan Iron Works Co., San Francisco, Cal.; capital, $100,000; Edward E. Eyrie and others, incorporators.

The tank manufacturers of the West, particularly hail the new use of oil as a power-producing agency. For instance, the United States Boiler Works Co., Chicago, informs the Chicago *Journal of Commerce*, that a large portion of their business at the present time, lies in the manufacture of oil tanks, to supply the furnaces and boilers of the various factories of the Northwest that have substituted oil for other fuel. Several other branches of industrial enterprise receive similar benefits from the increased consumption of oil.

The St. Paul Distilling Co., of St. Paul, Minn. is among the latest incorporations to adopt the Reliance Safety Water Columns, manufactured by the Reliance Gauge Co., of this city. They recently ordered 10 No. 1 combined high and low water alarm columns through Rogers & Ordway, of St. Paul.

STEEL BLOOMS BILLETS & SLABS — W. F. THORNTON — CLEVELAND O.

WANTED.

We want to place our new No. 19 Illustrated Catalogue and Price List in the hands of every responsible dealer in hardware, agricultural implements, stoves and tin, plumbing supplies, etc., in the United States, who may not have received a copy.

Manufacturers, architects and builders referring to this card will also be furnished copies free.

It is a complete treatise of our pumps, engines, rams and hydraulic machinery illustrating their adaption for manual, animal, wind, water, steam, oil, gas and electric power.

THE GOULDS MFG. CO.

Factory: 27-37 Ovid St., Seneca Falls, N. Y. Warehouse: 60 Barclay St., New York.

GOULDS MANUFACTURING CO'S CATALOGUE — PUMPS AND HYDRAULIC MACHINERY

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MANUFACTURERS OF

Morton's Lightning Keyway Cutters & Key Makers

MADE IN SIX SIZES.

Cutting Keyways and making Keys from 24 inches long down to the smallest work, with accuracy and rapidity.

Send for circulars and description.

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PIG & BAR IRON.

123 WATER STREET, Room 23. } CLEVELAND, O. { WAREHOUSE: 81 to 95 River St., cor. Main.

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BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

Dalliba, Corrigan & Co.,

Dealers in

IRON ORE AND PIG IRON.

101 St. Clair St., Rooms 20 to 22.

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Tuttle, Oglebay & Co.,

COMMISSION DEALERS IN

IRON ORES,

from Marquette, Gogebic and Menominee Districts.

CLEVELAND, O. 46

WILLIAM F. JARVIS & CO.,

(Successors to CHAS. HIMROD & Co.)

DETROIT, MICH.,

Pig Iron.

Sales Agents for following brands Lake Superior Charcoal Iron:

Vulcan Furnace Co.
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Sales Agents for State of Michigan Tennessee Coal I. & R. R. Co.'s brands, viz.:

South Pittsburg, Sewanee, Alice and Ensley.

Brier Hill Iron and Coal Co.'s brands, viz.:

Brier Hill Scotch, Tod, Grace, and Bessemer, and Globe Iron Co., Jackson, Ohio.

J. H. OUTHWAITE. W. G. POLLOCK.

J. H. OUTHWAITE & CO.,

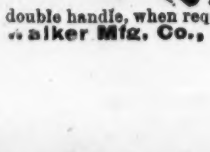
Exclusive attention given to

Lake Superior and Menominee Range

Iron Ores

CLEVELAND, OHIO.

Walker's Tool Holder.



For holding drills and reamers for lathe work. Prevents breaking or slipping. Can also be used for drilling and reaming holes by hand, and for reaming holes under drill presses, etc. Five holders in a set. Made with double handle, when required.

Walker Mfg. Co., CLEVELAND

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FOUNDRY COKE.

72-hour Connellsville Coke.

W. J. RAINEY.

Mercantile Bank Bldg. Cleveland

Pittsburgh & Wheeling Coal Co.,

Miners and Shippers of

OHIO STEAM COAL AND COKE.

Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 2,000 tons daily.

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Lake Shipping Point, Lorain, Ohio.

H. P. Hussey. Geo. H. Pomeroy.

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Strong Foundry and American Scotch Irons, Gray Forge and Bessemer irons for steel purposes.

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UNION ELECTROTYPE FOUNDRY 829 SHERIFF ST. CLEVELAND O

CLEVELAND BUSINESS DIRECTORY.

Bolt and Nut Works.

THE HOTCHKISS & UPSON CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws. 15

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boilers, Tanks, Stills, etc. 644 Broadway.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Coal, Iron and Ore.

PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

File Works.

INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

Foundries

BOWLER & CO., Car wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

TAYLOR & BOGGIS FOUNDRY CO. Fine Gray Iron Castings. 65 to 73 Central Way.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water St.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire. 34

THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 2

Hardwood Lumber.

MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

FISHER, WILSON & CO., Wholesale lumber dealers (pine & hardwood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way. 82

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils. 92 Seneca street. 54

BUSINESS DIRECTORY.

Akron, O.

MCNEIL, J. C. CO., Steam Boilers, Heavy Sheet Iron Work, &c. Repairing promptly executed.

TAPLIN RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

Canton, O.

NOVELTY IRON WORKS, Mill Work, Shafting, Engines, Imperial job printing press etc. 73

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds. 43

Mansfield, O.

MANSFIELD STEAM BOILER WORKS, Man'frs of Steam Boilers, Oil and Water Tanks, and all kinds of Sheet Iron Work. 03

Niles, O.

REEVES BROS., Manufacturers of Boiler Tank and Sheet Iron Work, etc. 54

Struthers, O.

SUMMERS BROS. & CO., manufacturers of Box Annealed Common and Refined Sheet Iron, and Superior Quality Shingle-Bands. 61

PROPOSALS.

Sealed proposals will be received addressed to the undersigned at the office of the Sandusky, Ashland & Coshocton Railway Company, Sloane Block, Sandusky, O., up to and including December 10th next ensuing, for the removal of the whole or part of sixteen thousand two hundred and sixty-seven (16,267) cubic yards of excavation, and bids can be made for sections of one hundred (100) feet in length, to the required depth.

Place of deposit for the excavation will be upon the ship yard site, as follows:

First—To construct a levee or dyke along the water or bay front, and on the east side of the dry docks in a line parallel with the boundary line of the dock yard site.

The dyke or levee will be eight feet broad on the base or foot with slopes one to one and to rise to three feet in height, plans for which will be ready for inspection on and after Wednesday, the 28th of November next.

Second—The remainder of the excavation which will approximate thirteen thousand (13,000) cubic yards will be distributed on the ship yard site contiguous to the levee or dyke.

The haul will be from a minimum of nothing to a maximum of 2,000 feet. Bids can be made for excavation and spreading, separately or together, per cubic yard.

The surplusage or accumulation of water in dry dock excavation must be removed by contractors, until excavation is completed.

Bidders are referred to Chas. A. Judson, Esq., C. E., for information.

Bonds will be required for the faithful performance of the work.

Proposals must state name and address of bidder, with names of at least two bondsmen.

Payments will be made in cash on estimates of Engineers.

Borings will be made to determine the character of the excavation.

W. D. CRANE, Trustee.

THE NEW YORK TRIBUNE

CONGRATULATES

Every American Farmer, Wage-Earner and Business Man, the Union Volunteer, the Settlers of the Western Territories, every Young Man and Woman, the Freedmen of the South, our American Fishermen and Ship-builders, and the Whole People Generally on the

SALVATION OF THEIR WELFARE,

which was won at the polls on November 6th. In the prosperity which is likely to follow, the men of both parties will share; but the Republican voters, workers and press, is due the credit.

During Gen. Harrison's administration "The Tribune" will continue to advocate the great measures of public policy, with which its name is identified. Great responsibilities now rest, not only on the new administration, but on the Republican party and press, with reference to shaping legislation so as to give practical effect to the will of the people. It is no time now, for farmers, wage earners, Union veterans and others, whose interests have been imperiled by an administration of free traders and Rebel brigadiers, to relax their interest in public affairs, and let things take their course. On the contrary, it would seem to be the duty of all voters to co-operate earnestly in the advancement of measures undertaken in their behalf, and to lend their support to great newspapers, which are doing original and aggressive work to promote their welfare.

It is conceded by the entire country that "The New York Tribune" has initiated a great variety of the valuable and successful popular discussions of the past year. Its labor for the farmer (not yet half finished) has been aggressive and effective. Its great exposure of the sham "reform" the Cleveland administration was crushing and final; no attempt was ever made to answer it. Its position on temperance brought back numerous third party voters to the Republican ranks. Its broadsides on the tariff and other questions have done much to prove, beyond question, that the Republican party is the best friend of the poor people of the country and of the settlers of the Western territories. It fixed beyond doubt the responsibility for the defeat of much needed pension legislation in Congress. On many other important questions "The Tribune" did loyal and successful work. It undertook for the sake of the cause, many important, laborious and far reaching tasks, involving immense research, and useful in setting in quicker motion the forces which won the victory. Its course in the future may be judged by the past.

"The Tribune" is not exclusively devoted to politics. It is a general newspaper, presenting the news of the world in each issue, together with fiction, miscellany, matters "for the Home Circle" and for "Young Folks," with excellent and accurate market reports, book reviews and foreign correspondence, and two pages a week on Agriculture. For the family it is absolutely unexcelled among newspapers.

Subscription Rates—Weekly, $1 a year; extra copy with every five. Semi-Weekly, $2 a year; extra copy with every five. Daily, $9.40 per year. Sunday "Tribune," $2. New subscribers receive the paper until Jan. 1, 1890.

Premiums—(1) Waverly Novels, complete in 6 vols. (2) Cooper's fascinating "Leather Stocking Tales," 6 vols. (3) Irving's "Life of Washington." (4) Ten one-dollar books, any one of which is sent for two subscribers, viz: "Essays of Lord Bacon," "Edgar A. Poe's Tales," "French Revolution, by Carlyle," "Great Generals by Great Authors," "Poems of Sir Walter Scott," "Greek Mythology," "Don Quixote," "Arabian Nights," "Robinson Crusoe," and "Swiss Family Robinson." (5) Winchester Hunting Rifle, breech-loading. (6) Remington breech-loading Shot Gun. (7) "New York Tribune's History of the United States and Pocket Atlas of the World." (8) "The Tribune's" great "Book of Open Air Sports." (9) "Wood's Household Medicine." (10) Webster's Unabridged Dictionary. (11) Waltham Watch. Send for circular describing them in full.

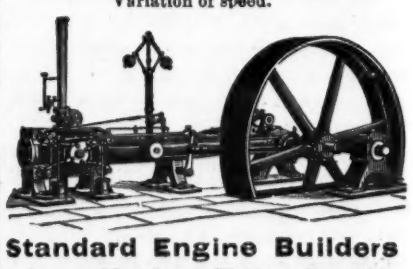
LIBRARY OF TRIBUNE EXTRAS.

Every year "The Tribune" prints an Almanac and Index and several bound "Extras." It is proposed now to systematize the publication of these Extras, and to issue them, regularly, once a month, 12 numbers per year. The Almanac will be issued in its old form, only with new, valuable and extensive additions to the contents, the number for 1889, by the way, containing complete returns of the Presidential election. The other numbers will be made up of about monthly magazine size. There will be one or two numbers, per year, devoted to the latest ideas in "knitting and crochet." Several will contain complete novels. Others will be made up of entertaining features of special and permanent value relating to Science, Society, Literature, Politics, etc. Single copies, 25 cents. Prices per year, for the 12 numbers, $2.

THE TRIBUNE, New York.

Cleveland Corliss Engine.

Unexcelled for Range of Power, without Variation of speed.



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Quarry Machinery, Hoisters, Derricks, Gang Saws, Horse Powers, Hand Powers, Grindstone Mandrels, Shafting, Hangers and Pulleys. Our

FEED WATER HEATER,

Heats Water with Exhaust Steam to 216°.

LORD, BOWLER & CO.,

CLEVELAND, O.

MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, November 28, 1888.

Iron Ore.

The present week to all appearances will see the last of lake shipments. Few vessel owners care to risk their craft after the expiration of marine insurance and since for at least a month past, shipments have been altogether confined to the daily output of such mines as were in a position to reap the benefit of higher prices, it may fairly be assumed that with the close of navigation not a pound of ore will be left at shipping points. The forthcoming reports of ore on docks along Lake Erie ports will doubtless prove a surprise to many, for despite the unexpectedly heavy shipments of the season, the consumption of ores has been so large that the amount still on docks will be found to fall far below that in sight at the coresponding date of last year. Notwithstanding the recent reports of the placing of several large orders for steel rails, it will be found that the mills generally will hardly be in a position to take decisive action until some time in January when the prices of ore will, with some degree of accuracy, settle quotations, or at least establish a basis for Bessemer pig. Of the season about to close it may be said that on the whole the producers have nothing much to complain of, while both vessel men and consumers of ore have had prosperous times. Those ore producers who disposed of all or nearly all the stock at May and June prices made no money, while those who either held off or increased their facilities after the advance came made a good profit.

Pig Iron.

The reports for the past two weeks apply equally well to this. Little movement is reported in the way of large transactions, while smaller orders, say, from one to three hundred tons, which are continually being placed, keep the furnaces in blast day and night to keep their engagements. Prices are full and very firm, the concessions coming usually from buyers in want of stock. There seems to be quite a general opinion that an advance in pig metal is one of the things of the near future. The reduction of reserve stocks continues without abatement, a fact which largely stimulates the market, and is no small means in the confidence of buyers and consumers. All the indications point to a brisker trade with the beginning of the new month, when the usual orders from foundrymen and manufacturers of agricultural implements are expected to come in, and a lively trade at this time, necessarily means higher prices. We quote f. o. b. cars, Cleveland, four months:

No. 1 Bessemer	$18 70@19 20
No. 1 foundry	18 20@19 70
No. 2 foundry	17 20@17 70
No. 1 gray forge, red short	16 70@17 20
No. 2 gray forge, neutral	16 20@16 70
No. 1 American Scotch	18 20@18 70
No. 2 American Scotch	17 20@17 70

Manufactured Iron.

A great scarcity obtains in bar iron, and the mills are crowded to the utmost to fill their orders for delivery long past due, while refusing to touch new orders for any definite delivery. The price has not yet advanced, but is quite firm at old quotations. There is little stock on hand in the way of car iron, and inquiries are quite lively from that source of consumption. The demand for sheets has perceptibly lessened, and the thinner gauges which had been very scarce, may now be again obtained. A famine of gas-pipe is threatened, despite the very large production, and holders are receiving fancy prices.

Scrap Iron.

One sale of three hundred and fifty tons of prime wrought scrap is reported at a private figure; also a sale of two hundred tons of rails at $24, containing some light and short stock. Inferior scrap is not wanted, and carwheels are plenty in stock.

Hardware.

With a regularity that leaves nothing to be desired, the jobbers continue to report an excellent business in light shelf goods and Winter stock. The steel trade is doing a fine holiday business, and the prospects are good on every side.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

While the anticipations of a large business immediately following the election have not been full realized, yet there is a healthy demand, and the outlook for 1889 is certainly bright. Furnaces continue to refuse orders at a concession of even twenty-five cents per ton, and as the consumer generally meets the sellers' views, it is safe to conclude there is no shading of prices on choice brands. The present prospects are that at the close of navigation there will not be enough ore on the docks at Ohio ports to last the furnaces until the opening of navigation next year, and this may lead to shipments being made all rail, at an advanced cost, and if so, prices of irons made from these ores would naturally go up in consequence. We quote for the present, as follows (Nov. 26):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 75@$20 25; Lake Superior coke, cinder mixed, $18 50@$19 00; Standard Ohio Blackband, $19 75@$20 25; Southern No. 1, $17 75@$18 25; Southern Gray Forge, $16 25@$16 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 50@$21 50.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.. W. W. Backman, Resident Agent.

After the active business spoken of in last week's report, a quieter tone has prevailed. Consumption is going on as heavily as ever, and demand has been fair. No large business, however, has come to light, and inquiries are not up to the usual average. It is already approaching the time of the year when buyers begin to defer new purchases until the close of the year's business. Prices remain firm, with a stiffening tendency in Lake Superior charcoal. We quote for cash, f. o. b., Chicago (Nov. 24):

Coke and Bituminous Coal Foundry:—Ohio (Hanging Rock softeners), $18 50@19 00; Ohio (Black Band softeners), $18 50@19 00; Ohio (Jackson county softeners), $18 60@00 00; Lake Ore and Cinder softeners, $17 75@18 25; Southern coke foundry No. 1, $17 50@18 00; Southern coke foundry No. 2, $17 00@17 50; Southern coke foundry No. 3, $16 50@17 00. Charcoal Foundry:—Lake Superior, $20 00@00 00; Southern, $19 50@20 50; Hanging Rock, $21 00@23 50. Car Wheel and Malleable:—Standard Southern, $21 50@26 25; Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 50@24 50; Lake Superior, Nos. 3 to 6, $20 50@21 50.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

Business has continued to be satisfactory, and prices are held firm since last report. There is no change in foundry irons, but in grey forge the market is firmer at every point. Some Southern furnaces feel so confident of a higher range of prices ahead, that they have wholly withdrawn from the market. At the same time, offerings are liberal, and demand and supply are very evenly balanced. This, in view of recent heavy increase in Southern production, speaks well for the strength of the market. We quote for cash f. o. b. Cincinnati (Nov. 24):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $16 25@$17 75; Ohio and Southern Coke, No. 2, $15 50@$16 00; Ohio and Southern Coke, No. 3, $15 25@$15 50; Ohio Soft Stonecoal No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 50@$16 00; Mahoning and Shenango Valley, $18 00@$18 50. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 00@$22 00; Tennessee and Alabama Charcoal No. 1, $18 00@$19 50; Tennessee and Alabama Charcoal No. 2, $17 50@$18 00. FORGE—Strong Neutral Coke, $15 00@$15 25; Mottled Neutral Coke, $14 00@$14 25; Cold Short Coke, $14 50@$14 75. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00; Lake Superior Malleable & Car Wheel, $21 00@$22 00.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co

Enquiry and sales continue at a very satisfactory rate in this market. Buyers are disposed to take hold more freely since the situation has been cleared of uncertainties. Orders during the week have ranged from car loads up to 1,000 tons. A still heavier buying movement is looked for in the early future. Everything looks favorable in this quarter for a good, healthful business among foundries and mills. We quote for cash, f. o. b. cars, St. Louis (Nov. 24):

Charcoal Foundry—Southern No. 1, $18 00@$19.00; Southern No. 2, $17.50@$18.50; Missouri No. 1, $17 50@18 50; Missouri No. 2, $17.00@$.8.00. Coal and Coke Irons.—Ohio Softeners, $18 00@21 00; Southern No. 2, $16 50@$18 00. Mill Irons.—Missouri, $16 00@16 50; Southern No. 1, $15 00@$16 50; Southern No. 2, $15 00@16 00. Car Wheel and Malleable Irons.—Lake Superior, $20 00@21 50; Southern, $20 00@24 00; Connellsville Coke, East St. Louis, $4 70; Connellsville Coke, St. Louis, $4 85.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

There has been steady buying during the week, and one large transaction for several thousand tons of mill and bright irons was made. The market is holding its own, and is as strong as at any time during the last ten days. There is a strong demand for brights and Southern silvery irons which are scarce, as most of the furnaces, are running on foundry grades, and it is reported that one furnace at Birmingham has made as much as 80 per cent. foundry iron for some time. We quote as follows (Nov. 26):

Southern Coke, No. 1, foundry, (new classification) $16 50@$17 00; Southern Coke, No. 2, Foundry, (new classification) $16 00@$16 50; Southern Coke, No. 3, Foundry, (new classification) $15 50@$16 00; Grey Forge, $15 00@$15 50: White and Mottled, different grades, $14 00@$14 50; Silver Grey, different grades, $15 50@$16 50; Southern Charcoal No. 1 Foundry, $17 75@$18 25; Southern Charcoal, No. 1, Mill, $16 00@$17 00; Southern Car Wheel, Standard brands, $22 75@$23 75; Southern Car Wheel, other brands, $19 00@$21 00; Hanging Rock Coke, No. 1, Foundry, $17 00@$17 50; Hanging Rock Charcoal, No. 1, Foundry, $20 75@$23 00; Hanging Rock, Cold Blast, $22 00@$25 00; Hanging Rock, Warm Blast, $19 00@$20 00.

WORTHLESS STEEL RESTORED.

Arrangements, says the Philadelphia *Inquirer*, are making for the manufacture of a peculiar kind of steel. "The process promises to revolutionize the steel business in some of its departments. By the process all this old steel, of which many tons annually are practically thrown away, can be converted into the highest grade of steel. The article that is turned out from the worthless rails is a very fine quality of malleable steel hitherto unprocurable without the greatest care and expense of manufacture. Several pieces shown illustrated the extreme ductility of the the metal. Samples were also exhibited showing how sections of it could be bent at right angles without the least break or giving being noticeable at the turn. To obtain this valuable quality of flexibility in steel of a high grade has hitherto been a most difficult thing to do, for the metal as it advances in quality increases in brittleness. For this reason it was impossible to use steel for various purposes where its employment would have been of the utmost value, and the invention overcomes this defect. The saving that will annually be effected by the employment of the old steel rails is something enormous and utterly unappreciable, though the amount will run into hundreds of thousands of dollars. Horseshoes, steel wheels and hundreds of small articles that have hitherto been made of iron can be manufactured of the new process metal. Another important item in connection with the matter is the extreme facility with which the new steel is welded. Experts assert that this is the first instance on record where it was found possible to weld two pieces of high grade steel. Specimens are exhibited of the new variety consisting of two, three and four pieces of the metal welded into one. Close inspection failed to discover where the different pieces joined, the edges appearing as if the section was one homogeneous whole. The intention is to have the plant in Pittsburgh or the immediate vicinity.

Labor in Ohio.

This morning, says a Columbus dispatch of Nov. 15, Hon. Henry Doren, Chief Inspector of Shops and Factories, filed his fifth annual report with the Governor. The report recommends that all stationary engineers shall pass a thorough examination before a competent board of examiners as to their qualifications, and that owners of boilers be compelled to insure them in some responsible company. The child labor law Mr. Doren recommends to be so amended as to prohibit children under 14 years of age from being employed in workshops, factories, merchantile establishments, telegraph offices or where goods are sold. The present law reads 12 years. The inspector also recommends that a law be passed in reference to supplying seats for female employes in manufacturing establishments at all times, when such use does not actually interfere with the proper discharge of their duties.

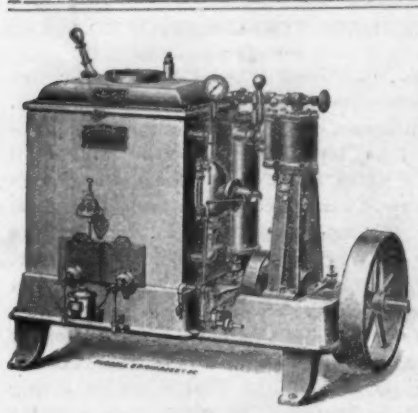
There are in the State 164,675 employes engaged at work in 3,271 shops inspected, in which there were 1,386 changes for bettering the condition of the workmen ordered. In the five large cities of the State, Cincinnati, Cleveland, Columbus, Toledo and Dayton, there are 95,888 employes in the shops.

English as She is Wrote.

An Indian paper gives the following as a genuine business notification from a business agency at Delhi: "For the Manufacturers of all parts of the World. I.—In Indian Delhi is well known to be the seat of Empire and the Liver of the Country. II.—The street of Chundnee Chouk, where this Office show rooms are established, is in the navel part of city. III.—Any makre who wish to rumour himself, among India and who means to make their article well known in this country, they ought to send either samples of their preparations or name Board cards, for exhibiting at our show rooms. The indents shall be submitted to them either direct or through houses, *i. e.*, as it is desired. Of course the manufacturers has to pay a yearly rent per measurement for such place (as much as their card or samples will surround) in advance.

Personal.

Wm. B. Phillips, Ph. D., late Professor of mining and metallurgy, University of North Carolina, Chapel Hill, N. C., and Clarence R. Claghorn, M. E., late engineer State Line & Sullivan County Railway (Loyalsock Coal Mines), Bernice, Pa., have formed a co-partnership as engineers, chemists and assayers, with offices at No. 2014 Morris avenue, Birmingham, Ala. They will furnish reports on all kinds of mining property; technical and metallurgical processes, analyses and assays.



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Crown hand fluter, Nos. 1 $15; 2, $12 50; 3, $10 ₱ doz .....dis 30

Gauges.

Marking .....dis 60&10
Wire.....dis 10&10

Gimlets.

Nail and Spike..... ..dis 50&10
Double Cut. low list..... 25
"Bee".....₱ gross $12. dis 25

Glue Pots.

Tin enamele d..... .....dis 40@
Family, Handy ..... dis 45

Grindstone Fixtures.

Sargent's..... dis70

Gun Wads.

U. M. C. & W. R. A.—B. E., 11up...	2 00 }
U. M. C. & W. R. A —B. E , 9&10...	2 30 }
U. M. C. & W. R. A.—B. E., 7&8....	2 60 } dis 20&2
U. M. C. & W. R. A.—P. E.. 11up...	3 10 }
U. M. C. & W. R. A.—P. E.. 9&10...	4 00 }
U. M. C. & W. R. A.—P. E.. 7&8....	4 90 }
Eley's B. E., 11 up.....	2 00
Eley's P. E..11@20.....	2 80

Hack Saws.

Griffin's Hack Saws, complete.....dis 40
Griffin's Hack Saw. Blades only.....dis 40
Diamond Hack Saws and Blades..... .....dis 25

Halters.

Jute horse and cattle ties.....$13.50 gro. net.

Hammers.

Maydole s..... .....discount 25@25&10
Atha new list, Jan 15, 1887.....dis 40&10@50
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30
Heavy hammers and sledges under 5 lbs, 36c, over 5 lbs, 30 c ..... dis 70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs, $15 ₱ doz....dis 10
Providence Tool Co., leg irons $25 ₱ doz.....dis 10
Tower's .....dis 15

Handles—

Door or Thumb Latches.

Per doz Nos.	0	1	2	3	4	
Sargent's	.90	1 00	1 18	1 35	1 50	dis 60&10
Roggin's Latches.....						₱ doz. 30@35c
Bronze Iron Drop Latches.....						₱ doz. 70c net
Jap'd store door handles—Nuts, $1 62; Plate $1 10; no plate $0 88.....						net
Barn door.....						₱ doz $1 80, dis 25
Wrought chest..						dis 5& &10&10
Surface chest.....						dis 70
Flush chest.....						dis 70
Lifting.....						dis 70
Saw and plane						dis 40&10
Hammer and hatchet.....						dis 25&5&2
Brad awl.....						₱ gross $2
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Hickory firmer chisel, large						₱ gross $5 00 }
Apple firmer chisel, assorted						₱ gros $5 00 } dis 40
Apple firmer chisel, large.....						₱ gross $6 00 }
Socket firmer chisel, assorted.....						₱ gross $3 00 }
Socket framing chisel, assort						₱ gross $5 00 }
File. assorted.....						₱ gross $2 75 }
Auger, assorted.....						₱ gross $5 00 } 25
Auger, large						₱ gross $7 00 }

Hangers.

Barn Door. old patterns..... ....dis 60&10 &10
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Scranton.....dis 25
Kidder's..... .....dis 50&10
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Paragon.....dis 40
Richards.....dis 20&10&10

Harness Snaps

German, new list .....dis 40&10
Covert, New Patent. new list..... ..dis 50&5&2

Hay Knives.

Lightning.....per doz. $11.50 net
Electric..... ₱ doz $17.00 dis 3

Hinges.

Wrought Strap and T Hinges .....65&10&2@70&10
Screw, hook and strap, 8 10 12 in..... 3½@4
to 36 in..... 2½@8
Screw hook & eye hinges...¼ ₱ doz 1.50 }
⅜ 2.45 } ...dis 10
½ 3.80 }

Gate, western.....₱ doz $4 40. dis 55
Gate, N. E. ..... ₱ doz $7 00, dis 55
Gate, N. E. reversible.....₱ doz $5 20, dis 55&15
Gate. Clark's. Nos. 1. 2. 3.....dis60&10@60&10&0
Gate. N. Y. State .....₱ doz $5 00. dis 55&15
Gate, automatic .....₱ doz $12 50. dis 50
Gate, common sense.....₱ doz pair $4 50, dis 50
Gate, Shepard's .....dis 60&1

Hollow-Ware.

Stove Hollow-Ware. Ground dis.....60&10&10
" Undground .....70&10
Enameled Kettles.. .....dis 70
Saucepans .....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each.....	55	60	65	75

Hoes.

Garden. mortar.....dis 65&5
Planter's. cot.....dis 65&5
Canton.....dis 65&5

Hog Rings and Ringers.

Hill's rings $2 50
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{ Improved $4 50
Blair hog ringers.....₱ doz $3.00

Hooks.

Bird Cage. Sargent's list.....dis 60&10&10
Belt.....dis 75&10
Clothes Line Sargent's list..... ...di 60&10
Ceiling Sargent's list..... dis 55&10
Coat and Hat. Sargent's list .....dis 55&10
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Hooks and Eyes—Brass.....dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable. ₱ lb...	23	24	25	26	28	dis25&10to25&10&10
Putnam, ₱ lb..	19	20	21	22	24	.....dis 15
Essex.....						33⅓&5

Burden.....₱ keg $4.25
R. I. Horse Shoe Co., Perkins' Imp. at factory.....₱ keg $4 25
Mule Shoes, at factory.....₱ keg $5.25

Hose, Rubber, Boston Belting Co's.

Standard..... 70
Extra..... 55&10
Best.....45&10

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd.....₱ doz. $3.00, dis 20

Ice Cream Freezers.

American.....50&10
Gem..... 55&10
Crown.....50&10

Ice Tongs.

Champion .....₱ doz $4.00, dis 25&10
Family.....₱ doz $2.75, dis 20@25

Jack Screws.

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Kettles.

Brass. 7 to 17 inches inclusive.....₱ lb 22c. net.
Brass larger than 17 inches..... ₱ lb 24c.
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Keys.

Eagle. cabinet, trunk and padlock...dis 33⅓ and

Knives.

Russell's Butcher.....net
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Knobs.

Carriage. Japanned.....₱ gross 80c. dis 60&10
Base, Rubber Tip.....dis 70&10&5
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Melting, P. S. & W .....dis 25&10

Lanterns

Tubular No. 0.....$4.50 per doz
" " 1..... 6 50
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Tubular. Lift Wire. No. 1. ₱ doz 7 00
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A 6"x10" SELF-INKING Foot Power Printing Press; will do good work. Address J. M., care Iron Trade Review, Cleveland, O. tf

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We guarantee our A. & D. Flue Cleaners to give Steam the most perfect spiral motion entire length of tubes, and do the best work.
CLEVELAND FLUE CLEANER MF'G CO.,
821y 74 Frankfort St., Cleveland, O

Engineers' Specialties.

The Crescent Lubricating Compound and Automatic Grease Cups will effect a saving of 75 per cent. over oil. Investigate their merits.
CRESCENT MF'G. CO.,
24 CLEVELAND, O.

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Two Engines and Six Boilers.

ONE 14x26 ENGINE, Webster, Camp & Lane, makers, with five-ton fly-wheel, and 6'x18', Pulley, Judson Governors, Oil Cups, and connections all complete in first-class order.

One 14"x28" Engine, Dick & Church, Meadville, Pa., makers, with five-ton fly-wheel, 6'x2½" Pulley, Judson Governors, Oil Cups, and all connections in first-class running order.

For Sale—Six Boilers, each twenty-four feet long, forty-two inches in diameter, two fourteen-inch flues to each boiler, with mud drums, steam drums and smoke-stacks with all connections. Boilers will be sold cheap and subject to the inspection of the Hartford Insurance Co.
AKRON IRON CO, Akron, O.

Receiver's Sale.

I will sell at Auction, on

FRIDAY, JAN. 4, 1889,

At 2 P. M., at New Hazleton, near Sherrodsville, Carroll County, Ohio, all the property of the

New York & Ohio Coal Co.,

Consisting of about one thousand acres of Coal Lands, with a full plant for working the same, with Harrison Mining Machines, and tipples, and other buildings, and some 60 dwelling houses.

This property is situated on the Wheeling & Lake Erie, and Cleveland & Canton Railroads, and is in first-class condition.

Also the exclusive right, for the State of Ohio, excepting one township in Hocking County, to use and sell the Harrison Mining Machine.

Also a large amount of tools, supplies, mules, etc., etc.

Information will be gladly furnished and correspondence is solicited.

A. St. J. NEWBERRY,
Receiver N. Y. & O. Coal Co.,
CLEVELAND, OHIO.
42 Mercantile Bank Bld'g.

Locks, Bolts, etc.

P. & F. Corbear, Locks & Bronze Goods.

Door locks, knobs and latches....dis 60
Escutcheons and keys....dis 60
Padlocks and padlock keys....dis 66⅔
Bell pulls, mineral, porcelain and jet....dis 60
Bell pulls, genuine bronze....dis 60
Lever bell pulls, genuine bronze....dis 60&10
Butts, genuine bronze....dis 60&10
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Store door locks and latches....dis 60&10
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Push plates, genuine bronze....dis 60
Drawer pull genuine bronze....dis 66⅔
Letter box plates, genuine bronze....dis 60&10
Barn door locks....dis 33⅓

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Porcelain lined....₱ doz $6 00, dis 25&35
Wood....₱ doz $3 00. dis 55
The "Boss"....₱ doz $2.50
Dean's No. 1, ₱ doz $6 50: 2, $3 35; 3, $1 90....dis
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Silver Lake, Braided, No. 0, $6.00; No. 1. $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross....dis 25
Masons' Linen....dis 40
Wire Clothes, No 18, $3.75; No 19, $3.25; No. 20 $2.75;....

Mallets.

Hickory....dis 20&10
Lignumvitæ....dis 20&10
Penfield Block Co., Lignumvitæ and Hickory....dis 30

Mattocks.

Regular list....dis 60@60&5

Meat Cutters.

	1	2	3	4	
Dixon's (P.S.&W.)	₱ doz. $14.00	$17.00	$19.00	$36.00	dis 40
Draw Cut No.	5	2	6	8	10
Each	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18 dis 45

Hale's—Nos. 11 12 13 $27 $33 $45 dis 70

Enterprise....dis 33⅓

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18....net
Smith's, ₱ doz. single, $4 50; double, $6 50 dis 40

Money Drawers.

Tucker's ₱ doz....$18 @20

Molasses Gates.

Stebbins' pat....dis 70
Stebbins' genuine....dis 66⅔&10
Stebbins' tinned ends....dis 40&10
Lincoln's pattern....dis 66⅔&10
Scoville....$7 45&10

Nails (wire).

List July 14 1887....dis 70
Standard Penny Nails, ₱ keg card rate
{ Car lots....$2 55
{ Less than car lots, $2 65

Nuts and Washers.

Size of bolt in	¼	5-16	⅜	½	⅝	¾	1
Square	8¼	7	5½	4¼	4	3¾	3¼
Hexagon	15¼	11¼	8¼	6	5¾	5¼	5
Washers	9	8	7	5	4¼	4¼	4¼

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.)....dis 40
Blake's pattern....₱ doz. $2 00, dis 10
Quakenbush....$5 00 net

Oakum.

Government....₱ lb 8 c
U. S. Navy....₱ lb 7¼c
Navy....₱ lb 6¼c

Oilers.

Zinc and Tin....new list dis 60&10
Brass and Copper....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz....dis 10@ 10&10

Packing, Steam.

Boston Belting Co....dis 60
American Packing....10@11c
Russia Packing....16c
Italian Packing....16c

Pencils.

Faber's Carpenters'....high list, dis 50
Faber's Round Gilt....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs....$12 dis 60@60&5
" 6 to 7 lbs....$13 dis 60@60&5

Pinking Irons.

₱ doz....65c. net

Picture Nails.

Brass head, Sargent's list....} dis 50&10&10
Brass head, combination list....dis 50&10
Porcelain head Sargent's list, dis....50&10&10
Porcelain head, combination list....dis 40&10

Plane Irons.

Sandusky Tool C....dis 20&10

Pliers and Nippers.

Button's Patent....dis 40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21 00 ₱ Doz....dis 20&10@33⅓
Gas Pliers....dis 50&10
Humason & Beckley....dis 50
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list....dis 70&10
Pocket levels....dis 70&10
Davis' inclinometers....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ doz. $36.00, dis 20&10
Eureka Diggers....₱ doz. $15.00 @ $16.00
Champion....per doz $9.00
Vaughan's Hollow Tube Post Hole....$12.00 dis40

Potato Parers.

White Mountain....₱ doz $5.00@$5.50
Antrim Combination....₱ doz $8.00
Hoosier....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ doz $18.00....dis 25
Disston's Pruning Hook....₱ doz $12.00 dis 25
Pruning Shears....₱ doz 3.75@$4.00 net

Pulleys.

Hot House....discount 60&10
Japanned Screw....discount 60&10
Brass Screw....discount 60&10
Japanned Side....discount 60&10
Japanned Clothes Line....discount 60&10

Pumps.

Cistern, best makers....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality. 65@75c
Bemis & Call Co.'s Cast Steel Drive....dis 50&5
Bemis & Call Co.'s Springfield Socket....dis 50&5
Solid Tinners....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass....₱ lb 35c dis 20
Sliding Door, Iron, Painted...₱ foot 6c dis 40&10

Rakes.

Cast Steel....dis 65&5
Malleable....dis 65&5

Razors.

J. R. Torrey Razor Co....dis 20
Wostenholme & Butcher....$10 @ £....dis 10
Rifle Razor....$9 50 net

Rivets.

Iron, Thousand, list November 17....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17....dis 50
Copper....dis 50

Rods.

Stair. Brass....dis 25&2

Rollers.

Barn door, Sargent's list,....dis 60&10&10
Acme (Anti-Friction)....dis 55

Rope.

Manilla. ¼ inch and over....11½c
Sisal, ¼ inch and over....11c

Rules.

Boxwood....discount 80@80&10

Sad Iron.

From 4 to 10 lbs....per 100 lbs. 3c
Self-heating....₱ doz $9 net
Self-Heating, Tailor's....₱ doz $18 net
Mrs. Potts's Irons....dis 40&10
Enterprise Star Irons....discount 40&10

Sash Weights.

Per ton....$22.50@$25.00

Saws.

Disston's Circular....discount 45
Disston's hand panel, rip &c....discount 25
W. M. & C., Champion Regular....per foot 23c
W. M. & C., " Thin Back....₱ ft 24c

Saw Frames.

White, Vermont....₱ gross $12 00
Red, polished & varnished ₱ doz $1.50,....dis 25

Saw Sets.

Aiken's Genuine....$18.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 ....dis 40 &10

Scales.

Hatch, Counter, No. 171....₱ doz $21.00
Hatch, Tea, No. 161....₱ doz $6.75@7.00
Chatillon's Grocers....dis 50
Family Turnbulls....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50....dis 30&10
Box, 1 Handle....₱ doz $4.00, dis 10
Foot....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles....dis 60&10
Sets Interchangeable....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1881.

Flat head iron	dis 70
Round head iron	dis 65
Flat head brass	dis 65
Round head brass	dis 60
Flat head bronze	65
Round head bronze	60

Extra ....10 off on cotton given

Machine, flat head, iron	dis 55
Machine, round head, iron	50
Bench and hand—	
Bench, iron	25&10
Bench, wood, beech, per dozen	$2.25
Bench, wood, hickory	20 & 10
Hand, wood	20&10
Lag or coach	dis 66⅔@70
Coach, patent gimlet point	66⅔@66⅔&5
Bed	25&5
Hand rail	66⅔&10

Saw Tools.

Atkins' patent....₱ doz sets $6 00

Shears.

American (Cast) Iron....dis 75&10
Pruning....See Pruning Hooks and Shears
Garnard's Lamp Trimmers....₱ doz $4.00
Tinners'....dis 20&2
Seymours List, Dec. 1881....dis 60 &10&5
Seymours Tailor's Shears....dis 33⅓

Scroll Saws.

Lester, complete, $10.00....dis 25
Rogers, complete, $4.00....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885....dis 55&2
Sliding Door, Patent Roller....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's....dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White....dis 20 & 5

Shovels and Tongs.

Iron Head....50&10&5
Brass Head....50

Sieves.

Metallic, new list....dis 60&10
Flour sifters { Victor....$2 00
Flour sifters { Hunter....$2 25
Flour sifters { Comet....$1 25

Slates.

School, by case....dis 50&5@50&10

Spoke Shaves.

Iron....dis 30
Wood....dis 30

Spoke Trimmers.

Bonney's....₱ doz $10.00 dis 50
Stearns'....₱ doz $9.00 dis 20&10

Spoons.

Basting Spoons....dis 70&10
Britannia....dis 50
Rogers Bros....dis 50&10

Squares.

Steel and iron....} dis 70@10&75
Nickel plated....}
Disston's try square and T bevels....dis 45
Winterbottom's try and miter....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's....dis 35
"Lightining" screw plate....dis 15

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone....No. 1, ₱ lb 20
Turkey Oil Stone....4 to 8 in....₱ lb 4
Turkey Slips....$1.00@1.50
Washita Slips No 1....₱ lb 37@38
Washita No 2 stone....₱ lb 15c
Arkansas Stone....2.00

Stove Boards.

Zinc....70
Oxidized....45

Shovels and Spades.

Ames' list Nov 1 1885....discount 20
Dennis....5.50
Hussey & Binns, rail road....8.00

Stove Polish.

Joseph Dixon's....₱ gross $6 00 dis 10
Gem....₱ gross 4 50 dis 10
Gold medal....₱ gross 6 00 dis 25
Rising Sun....₱ gross $5 50 net
Dixon's plumbago....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering....dis 25
Reed's Brick and Plastering....dis 25
Disston's Brick and Plastering....dis 20
Brade's brick....dis 20

Tacks, Brads, &c.

New List, September 1, 1882. & Supplement Jan-1, 1886.

American iron carpet tacks all kinds dis	72½&10
Steel carpet tacks all kinds	72½&10
Swedes Iron carpet tacks all kinds	72½&10
Swedes iron tacks	67½&10
Swedes iron Upholsterers' tacks	67½&10
Tinned Swedes iron tacks	67½&10
Tinned Swedes iron Upholsterers' tacks	67½&10
American iron cut tacks	70&10
Copper tacks	33½&10
Copper finishing and trunk nails	33½&10
Cigar box nails	45&10
Finishing nails	60&10
Hungarian nails and miners' tacks	60&10
Gimp and lace tacks	67½&10
" " " tinned	67½&10
Trunk and clout nails	60&10
Tinned trunk and clout nails	60&10
Basket nails	60&10
Chair nails	60&10
Common and patent brads	60&10
Tinned capped trunk nails	60&10

Tinware.

Stamped, Japaned & Pieced, list Jan 20, 1887....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion)....dis 20&10@30

Traps.

Game, Newhouse....dis 35
Victor....60&10
Wood, mouse....15c ₱ doz holes
Delusion, mouse....₱ gross $18 00 dis 15

Transom Lifters.

Wollensak's Patent....dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls	21½c	27c
No. 18, " " ¼ and ½ "	21½c	27c
No. 36, " " ¼ and ½ "	20c	25c
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	17	
3-Ply " 1 lb Balls	17½c	
3-Ply " 1½ lb Balls	16c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid box....50&10&5@60
Parker's....discount 20@25
Prentiss...." 20 &5@25
Stephen's...." 25
Saw Filers, Wentworth's....dis 20&10
Saw filers, Stearn's....33⅓&10

Washer Cutters.

Smith's Patent....₱ doz $12 00, dis 20&10&10
Johnson's....₱ doz $11 00, dis 33⅓
Penny's....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's....₱ doz $16 00, dis 60&10
Bonney's....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire. New List Jan. 18. 1884

Brass and Copper....discount 20
Bright and annealed, Nos. 0 @ 18 ... dis 70&5@72½
" " Nos. 19 @ 26....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18,....dis 65
Cast steel....dis 50
Tinned Broom Wire....dis 70@72½
Annealed Fence, Nos. 8 and 9....dis 75
Annealed Grape, Nos. 10 to 14....dis 75
Stubs Steel Wire regular....$6 00 @ lb dis 30

Wrenches.

Coe's genuine, cash in 10 days....55 & 3
Girard Standard....discount 70&10
Agricultural....discount 75&10
Mechanics'....dis 55&10 & 3
Bemis & Call's Combination....25&10
Donohue's Engineers'....25

TINNERS' STOCK.

Tin.

Banca....25
Straits....24½
English....24½
Bar....26

Spelter.

American, cash, ₱ lb....

Charcoal Tin Plate.

IC 12x12 225 sheets	$6 00@6 50
IX 14x20 112 sheets	7 25@8 00
IC 10x14 225 sheets	₱ box 5 75@6 25
IC 20x28 112 sheets	12 25@14 00
IX 10x14 225 sheets	7 25@8 00
IX 12x12 225 sheets	7 75@8 25

For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations only
No. 1, Refined } Quotations only
Bingham } Quotations only

Zinc.

in c, cask....6¼
in c, open....7

LEAD.

Pig....
Bar ₱ lb.... } Quotations on application.
Pipe ₱ lb.... } Quotations on application.
Sheet. ₱ lb.... } Quotations on application.
Chilled Shot ₱ bag 25 lbs.... } Quotations on application.

BABBIT METAL.

No. 4....6
Allens....9¼
Excelsior....15
W. B. Genuine....25

COPPER.

Lake Ingot....17¼
Arizona....16¼

IRON AND STEEL

Flat Bar

1¼ to 4 by ⅜ to 1 inch....1 85
4½ to 6 by ⅜ to 1 inch....1 95
1¾ to 6 by 1½ to ¼ inch....2 25
1¼ &1¾ by ⅝ to ½....1 95
1 &1¾ by ¾ to ¾....1 95
⅝, ¾ and ⅞ by ⅜ to ¾....2 35

Round and Square.

1 to 1⅞ inch....1 85
2 to 2⅝....2 05
2¾ to 3¼ inches....2 25
3⅜ to 4....2 85
4¼ to 4¼....3 35
4¾ to 5....3 55

Oval.

⅜ to 1¼ inch....2 25
⅝ to ¾....2 45
⅞....2 65
1....3 05

Half Oval and Half Round.

1¼ to 3 inch....2 95
⅜ to 1¼....2 55
⅝ to ¾....3 05
1....3 35
1¼....4 85

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch....2 0
1 to 1⅜ by ¼ and 5-16 inch....2 15
¾ to ⅞ by ¼ and 5-16 inch....2 35
1 to ⅝ by ¼ and 5-16 inch....2 85

Hoops.

1¼ to 4, Nos. 13 to 15....2 65
1¼ to 2, Nos. 16 to 18....2 75
1¼ to 2, No. 19....2 85
1¼ to 2, No. 20....2 95
1¼ to 2, No. 21....3 05
1¼ to 2, No. 22....3 15
15-16, 1 and 1⅛, Nos. 13 to 15....2 85
15-16, 1 and 1⅛, Nos. 16 to 18....2 95
15-16, 1 and 1⅛, Nos. 19 and 20....3 05
15-16, 1 and 1⅛, No. 21....3 15
15-16, 1 and 1⅛, No. 22....3 35
⅞, Nos. 13 to 15....3 05
⅞, Nos. 16 to 18....3 15
⅞, Nos. 19 and 20....3 45
⅞, No. 21....3 35
⅞, No. 22....3 45
13-16, Nos. 13 to 15....3 25
13-16, Nos. 16 to 18....3 35
13-16, Nos. 19 and 20....3 45
13-16, No. 21....3 55
13-16, No. 22....3 65
¾, Nos. 13 to 15....3 35
¾, Nos. 16 to 18....3 45
¾, Nos. 19 and 20....3 55
¾, No. 21....3 65
¾, No. 22....3 75
11-16, Nos. 13 to 15....3 55
11-16, Nos. 16 to 18....3 65
11-16, Nos. 19 and 20....3 75
11-16, No. 21....3 85
11-16, No. 22....3 95
⅝, Nos. 13 to 15....3 85
⅝, Nos. 16 to 18....3 95
⅝, Nos. 19 and 20....4 05
⅝, No. 21....4 15
⅝, No 22....4 25
⅝, No. 23....4 35

Light Band

1¼ to 6 by ⅛ to 3-16 in....2 35
1¼ to 6 by Nos 1 and 12....2 45
1 to 1⅜ by ⅛ to 3-16 in....2 45
1 to 1¾ by Nos. 11 and 12....2 55
7-8 and 13-16 by ⅛ to 3-16 in....2 75
⅞ and 13-16 by Nos. 11 and 12....2 85
¾ and 11-16 by ⅛ to 3-16 in....3 05
¾ and 11-16 by Nos. 11 and 12....3 15
⅝ and 9-16 by ⅛ to 3-16 in....3 35
⅝ and 9-16 by Nos. 11 and 12....3 40
½ by ⅛ to 3-16 in....3 60
½ by Nos. 11 and 12....3 70

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12....2 85
⅛ inch, " " " 13 and 14....3 15
¾ inch, " " " 11 and 12....3 15
¾ inch, " " " 13 and 14....3 35

Sheet Iron.

No. 13 to 4....2 55
No. 15 to 17....2 75
No. 18 to 21....2 85
No. 22 to 24....2 95
No. 25 to 26....3 05
No. 27....3 15
No. 28....3 35

Iron Boiler Plates.

Tank, ¼ inch and heavier....2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1-4 in. and heavier.

Tank....$2 55
Shell....$3 05
Flange....$3 30
Marine Flange....$3 80
Fire Box....$4 45

Above includes plates 90 inches wide.
90 to 96 in wide....½c. lb extra.
96 to 100 in. wide....1 c. "
100 to 104 in. wide....1½c. "
104 to 116 in. wide....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lb
to 2 in. inclusive	.09
9-16 to ½ in.	.09
7-16 to ⅝ and 2⅛ to 3 in.	.10¼
3⅛ to 4 in.	.11
⅝ to 11-16 an	.10¼

TRAVELER'S REGISTER.

Standard Time.

Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.—"The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	5 45 a m
WESTWARD.	**ARRIVE.**	**DEPART.**
Chicago Passenger	.....	6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:24 a. m. 12:10 p. m., 5:05 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 50 p m	7 45 a m
New York Express	6 55 p m	1 35 p m
Alliance & Akron Accom.	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 p m
Akron, Col. & Zanesv'e Ex.	12 50 p m	1 35 p m
Akron & Orrville Accom.	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.

Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex.	*1 35 a m	*1 40 a m
No. 8, N. Y. & B'f'o & At. Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom.	†7 45 a m	
No. 10, Toledo & Sandusky Accommodation	†1 05 a m	
No. 24, Buffalo Accom.		†7 00 a m
No. 10, N. Y. & Boston "Flyer."		*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 26, Conneaut Accom.		†4 25 p m
TRAINS GOING WEST.	**Arrive from East.**	**Depart West.**
No. 1, Fast Limited Ex.	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	
No. 3, Chi. Ex. via Sand'y.	†5 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k		†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9, hi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only		†4 30 p m
No. 27, Conneaut Accom.	†8 10 a m	

Sunday train for Nottingham—Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday.

A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.

For further information as to trains, connections and sleeping car berths apply at the City Ticket Office 229 Bank St., Mercantile Bank building. Telephone 669.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Sherrodsville and Coshocton 9 55 a.m., 7 00 p.m.

Kent —*7 50 a.m., *7 16 p.m.

Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.

Newburgh and Miles avenue—7:10 a.m.. 4:15, p.m. 5:33 p.m.

Depart—

Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.

Kent—*8:38 a.m. and *8:30 p.m.

Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.

Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.

Trains marked with * run daily. All others daily except Sunday.

Depot at Ontario street, one block east of Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—

No. 1, Cleveland, Bradford and East, 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland, 7 45 a.m
No. 5, Beaver Falls Accommodation, 8 40 a.m
No. 7, Buffalo, New York, and all New England points, 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis, 1 10 p.m
No. 11, Buffalo Express, 3 30 p.m
No. 13, Beaver Falls Accommodation, 5 20 p.m
No. 15, Buffalo Express, 10 30 p.m

Arrive from—

No. 2 Beaver Falls Accommodation, 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. 6 55 a.m
No. 6, Youngstown Accommodation, 9 20 a.m
No 8 Beaver Falls Accommodation, 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis, 1 35 p.m
No. 12, Buffalo Express, 5 45 p.m
No. 14, Cincin., St. Louis and Cleveland, 8 05 p.m
No. 14, Cleveland & Buffalo Express, 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
D. SMITH, Gen'l Pass. Ag't, Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888.
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 13*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 05	5 45	10 01
Fremont	9 06	2 30	6 10	1 45
Clyde	9 22	2 47	6	11 15
Bellevue	9 37	3 03	6 40	11 40 PM
Monroeville...lv	9 55	3 20	6 8	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 06
Creston	11 53	5 20	9 05 PM	4 47
Orrville.....ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville.....lv	12 40	5 53	7 05 AM	7 05
Massillon.....ar	1 20	6 35	7 52	7 52
Massillon.....lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley Junc.lv.	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston....ar	2 58 PM	8 15 PM	9 50 AM	9 50 AM
Canal Dover	2 57 PM			
New Comerst'n	3 38			
Cambridge	4 35			
Macksburg	6 02			
Marietta.....ar	7 15 PM			

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta.....lv	6 45 AM	2 20 PM		
Macksburg	7 56	1 30		
Cambridge	9 25	3 00		
New Comerst'n	10 23	3 58		
Canal Dover	11 04 AM	4 38 PM		
Bowerston	11 25 AM	3 45 PM	5 55 AM	
Leesville	11 32	3 55	6 02	
Sherrodsville	11 40	4 10	6 10	
New Cumberl'd	11 52	4 25	6 22	
Valley Junc	12 20 PM	5 02	6 45	
Navarre	12 50	5 35	7 35	
Massillon	1 05	5 50	8 00	
Orrville.....ar	1 40	6 25	8 55	
Orrville.....lv	1 45	6 35*	9 13	
Creston.....lv	2 18	7 02	9 43	
Wellington	3 06	7 43	10 33	
Norwalk	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20		12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar. Huron ..Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	.....Milan	9 28	6 03
Lv 3 55	Lv 6 45	.....Norwalk.....	Ar 9 55	Ar 6 30
Ar PM	Ar AM		Lv AM	Lv AM
.....	.....	...Monroeville..	.....	.....

* Daily.

Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m

This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.

Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL, Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.

In effect May 27, 1888.

THE SHORT LINE TO ALL POINTS

North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Haverhill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland.....Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Haverhill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 06 "	2 39 "	10 31 "
Columbus.....Ar	8 20 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.

JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't. Columbus, Ohio

Ft. Wayne, Cincinnati & Louisville

RAILROAD.

THE POPULAR ROUTE

BETWEEN THE

NORTH and SOUTH

THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER 13
—BETWEEN—
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER 22
AND QUICKER
By **3 HOURS**, Between
Louisville and Fort Wayne.

Ask for Tickets
—VIA—
Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines, EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

The Picturesque Lehigh Valley Route

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent Bethlehem, Pa.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums, time of expiration, etc., will be sent post-paid on receipt of $1.00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

Address,

Cleveland Printing and Publishing Co.

Cleveland, Ohio.

Detroit & Cleveland

STEAM NAVIGATION CO.

Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week,

and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

VALLEY RAILWAY.

Depot foot South Water Street

	Arrive.	Depart.
Valley Junction Mail	*7 45 a m	*6 50 p m
Marietta Express	†11 20 a m	†1 30 p m
Valley Junction Express	* 4 16 p m	* 9 55 a m
Akron & Cleve. Accom	* 7 40 p m	*7 45 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, Gen. Manager, R. A. CARRAN, Gen. Pass. Ag't.

THE FAVORITE

AND

Picturesque Route

TO

New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.

Central, or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express,	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express,	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 25 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express,	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m.

* Daily .† Daily, except Sunday.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. **Ship by Erie Express.**

E. B. THOMAS, 2d Vice President, Cleveland, O.

L. P. FARMER, Gen'l Pass. Agent, New York.

W. C. RINEARSON, Ass't G. P. A., Cincinnati, O

M. L. FOUTS, City Passenger Agent. 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN

Marietta Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect October 14, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 50 AM	2 00 AM	..Parkersburg..	2 45 PM	11 45 PM
11 50	6 45	.....Marietta.....	10 00 AM	7 03
12 08 PM	7 03	.....Caywood....	9 41	6 43
12 14	7 09	..... Stanley.....	9 35	6 38
12 29	7 25	.....Whipple.....	9 20	6 23
12 39	7 35	.....Warner.....	9 10	6 13
12 53	7 50	.....Elba.....	8 56	5 59
1 00	7 57	...Macksburg...	8 49	5 52
1 07	8 04	...Dexter City...	8 42	5 45
1 11	8 09	...South Olive...	8 38	5 40
1 17	8 16	.....Dudley.....	8 32	5 33
1 25	8 25	.....Caldwell.....	8 25	5 26
1 35	8 35	..Belle Valley...	8 0	5 16
1 44	8 44	..... Ava.....	8 00	5 06
1 56	8 56	..Pt. Pleasant...	7 47	4 54
2 0	9 08	.....Byesville.....	7 33	4 40
2 28	9 27	...Cambridge...	7 14	4 24
2 35	9 33	.....Oldham's.....	7 04	4 14
2 42	9 40	.....Miller's.....	6 57	4 07
2 57	9 50	...Kimbolton...	6 47	3 57
2 57	9 55	.....Guernsey....	6 42	3 52
3 04	10 02	.....Post Boy.....	6 35	3 45
3 15	10 13	N. Comerstown	6 25	3 35
3 25	10 20	..... Wolf's	6 16	3 25
3 36	10 33	..Phillipsburg..	6 05	3 14
3 41	10 38	..Black Band....	6 00	3 09
3 47	10 44	....Turner's.....	5 55	3 03
3 57	10 55	...Canal Dover..	5 45 AM	2 53
4 17	11 17	ar. Vall'yJ'n. lv		2 30
	.....	lv. Vall'yJ'n. ar		.....
	12 23 PM	.....Canton.....		1 18
	1 18	.....Akron.....		12 20
	2 40	... Cleveland....		11 20 AM
	8 15	.....Buffalo		5 40
11 15 PM	6 20	.....Toledo.....		7 45

Train No. 8 leaves Marietta at 3 00 p. m. Whipple 4 00, Warner 4 15, Elba 4 35, Macksburg 4 45, Dexter City 4 55, Caldwell 5 26, arriving Cambridge 7 00 p. m. Train No. 5 leaves Valley Junction at 4 50 p. m., arriving at Canal Dover 5 12 p. m.

Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland, and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio river Packets; at Cambridge with the B. & O. east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W. and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

A. T. WICKOFF, Gen. Manager. W. K. RICHARDS, Gen. Pass. Agt.

⅛ to 6 in.	11½
¼ to 9-32 and 6½ to 7 in.	12
3-6 in.	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	02¾
Tire "	02¾
Spring	03¼
Sleigh Shoe	02¾
Toe Calk	03
Cutter Shoes, tapered and burr	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3⅛ to 4 "	0.3
4⅛ to 6 "	1.0
¾ to 15-16 "	0.2
⅛ to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7

Machine cutting, specified lengths, ab'e 24 in...0.2
Machine cutting, specified lengths, 12 to 24 in....0.4
Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS.

	cts. per lb ex.
1½ to 6 in., by 5-16 to 1 in. thick	base
1½ to 6 in., by ¼ and 9-32 in. thick	0.2
1½ to 6 in., by 3-16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in. thick	0.4
⅜ to 1 7-19 in.; by ⅛ to 1 in. thick	0.3
⅜ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
⅜ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
⅜ to 11-16 in., by ¼ to ½ in. thick	0.4
⅜ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅜ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅝ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1⅛ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS.

	cts. ex.
1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1⅛ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅛ to 3 in. by No. 8 gauge to 10 gauge "	1.0
⅜ to 3 in. by No. 11 gauge to 16 gauge "	2.0
½ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅝ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅝ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅝ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 nch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL.

	cts. ex
⅜ to 1⅛ inches	base
¼ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1½c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2½c
Pipe mill castings	3 c
Rolling mill castings under 50 lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3½c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails	gross tons $27 00
Old steel rails	23 00
Car wheels	20 00
Old copper	per lb 7
No. 1. H. red Brass	8¼
Heavy yellow brass	6½
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	
XX str	50
Wrought iron pipe: Lap black X str	
XX str	60
Wrought iron pipe: Butt galv	40
" " Lap "	50
Lap-welded boiler tubes	50
" drive pipe	
" casing	
Lead pipe per lb	
Sheet lead "	
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	65
" flange unions	72½
Long screws	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Throttle and butterfly valves	50&10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	57½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge cocks	55
Bingham "	30
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&10
Gas fixture fittings	55
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	25
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs }	
" " stops, shower stops, hydrant and ball cocks }	55&10
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No. 1 to 13 inclusive	50&10
" " above No, 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' Hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Kureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 06	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
⅝	0 07	0 09	.113	1 12	14	0 05
¾	0 09½	0 12½	.134	1 67	11½	0 06
1	0 12½	0 17	.140	2 24	11½	0 07
1¼	0 22	0 25	.145	2 68	11½	0 08
1½	0 28	0 32	.154	3 61	11½	0 10
2	0 44	0 49	.204	5 74	8	0 15
2½	0 58	0 64	.217	7 54	8	0 20
3	0 70	0 86	.226	9 00	8	0 25
3½	0 85	1 00	.237	10 66	8	0 35
4	1 00	1 25	.246	12 49	8	0 45
4½	1 20	1 50	.259	14 50	8	0 55
5	1 65	2 00	.280	18 76	8	0 70
6	2 00		.301	23 27	8	0 85
7	2 75		.322	28 18	8	1 00
8	3 70		.344	33 70	8	1 20
9	4 75		.366	40 06	8	1 25
10	5 75		.375	45 02	8	1 50
11	6 50		.375	49 00	8	2 50
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Price, Lap-Welded Drive Pipe	8	10	12		15	22	22		30		40	50	60	68	90	1 20	1 65	2 00	3 00		4 50

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Size, Inside Diameter Nominal	2	2¼	2½	3	3¼	3½	3¾	4	4¼	4½	4¾	5	5 3-16	6¼	6⅝	7⅝	8¼	8⅝	9⅝
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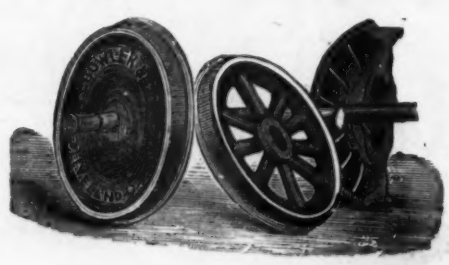

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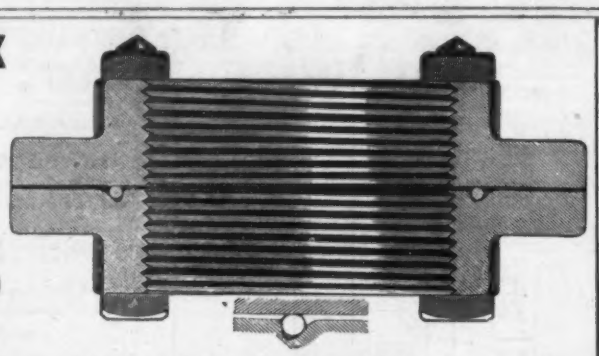

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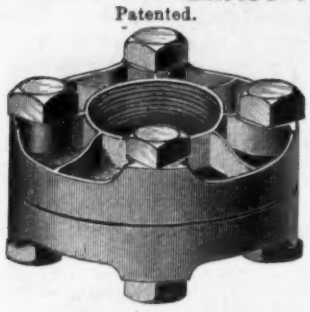

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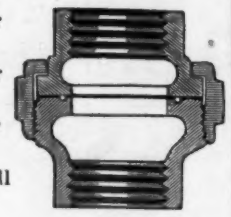

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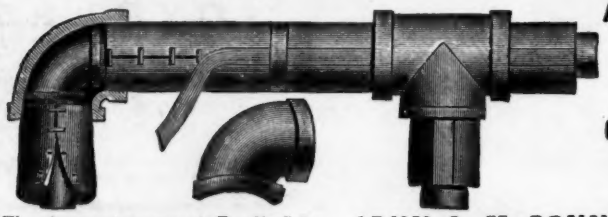

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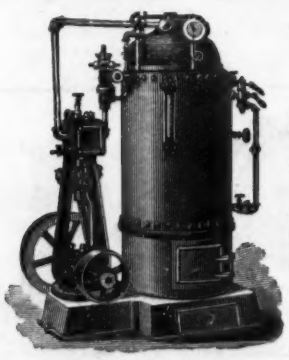

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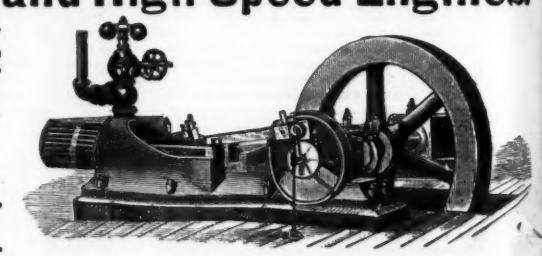

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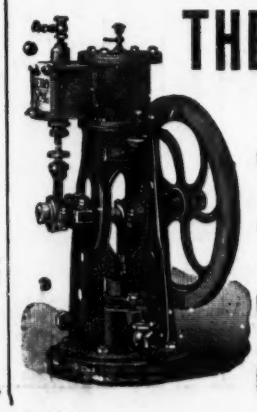

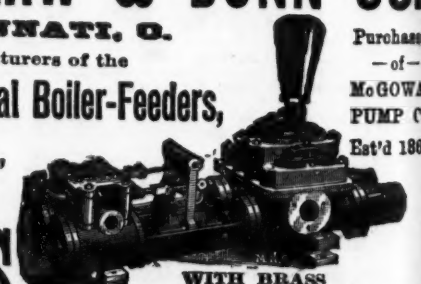

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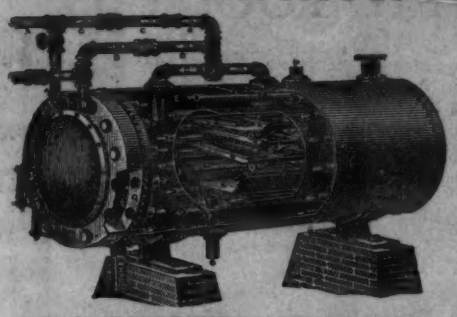

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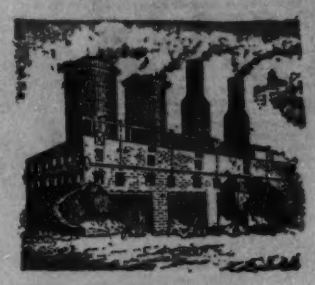

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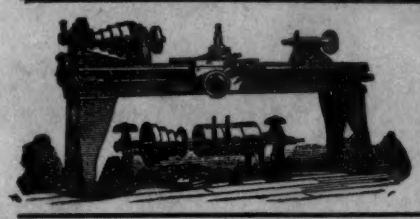

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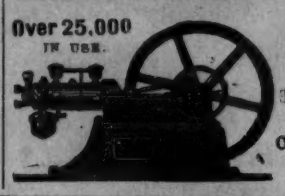

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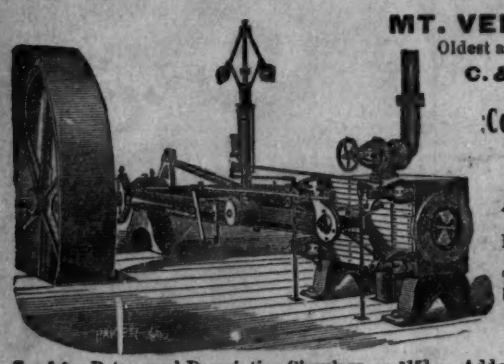

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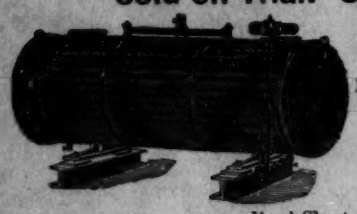

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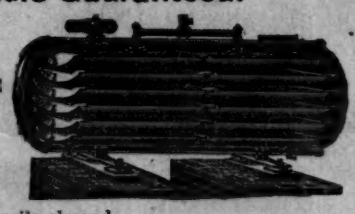

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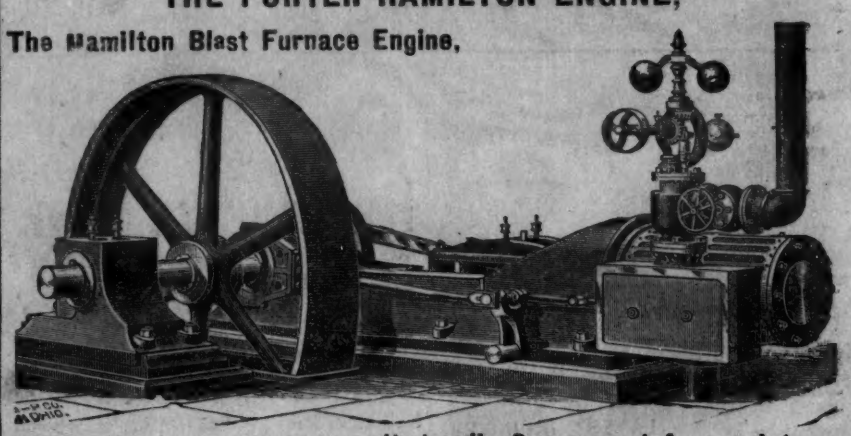

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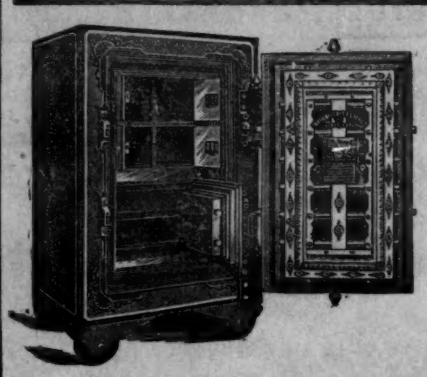

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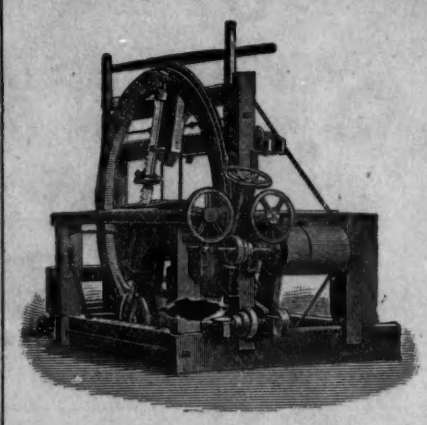

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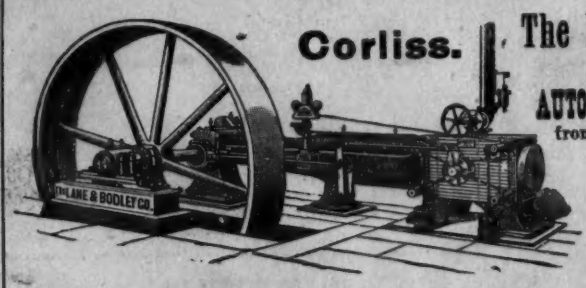

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